









SMITHSONIAN MISCELLANEOUS COLLECTIONS  
VOLUME 127 (IN TWO PARTS), PART II

---

Charles D. and Mary Vaux Walcott  
Research Fund

---

CHAZYAN AND RELATED  
BRACHIOPODS

PART II, PLATES

(WITH 269 PLATES)

By

G. ARTHUR COOPER

Curator of Invertebrate Paleontology and Paleobotany  
United States National Museum



(PUBLICATION 4253)

CITY OF WASHINGTON  
PUBLISHED BY THE SMITHSONIAN INSTITUTION  
JUNE 12, 1956

THE LORD BALTIMORE PRESS, INC.  
BALTIMORE, MD., U. S. A.

Charles D. and Mary Vaux Walcott Research Fund

CHAZYAN AND RELATED BRACHIOPODS:  
PART II, PLATES

By G. ARTHUR COOPER

Curator of Invertebrate Paleontology and Paleobotany,  
United States National Museum

EXPLANATION OF PLATES

(Page numbers refer to text, Part I.)

PLATE I

LINGULELLA, OBOLUS, PSEUDOLINGULA, WESTONIA

	Page
A. <i>Westonia clathrata</i> (Winchell and Schuchert).....	209
(1) Exterior of pedicle valve, showing wavy parallel lines, $\times 8$ , paratype, 45546a;	
(2) exterior of brachial valve, $\times 6$ , lectotype, 45546b.	
Decorah formation (Guttenberg member— <i>Rhinidictya bed</i> ), St. Paul, Minn.	
B. <i>Westonia</i> sp. 1.....	210
(3) Exterior of a pedicle valve showing a chevronlike ornamentation, $\times 6$ , figured specimen, 116781a.	
Whitesburg formation just above the Fetzer formation, $2\frac{1}{2}$ miles southeast of Whitesburg, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.	
C. <i>Lingulella virginiensis</i> Cooper, new species.....	206
(4, 5) Respectively exterior views, $\times 4$ , of the brachial and pedicle valves of the holotype, 109296, showing difference in ornamentation of the valves.	
"Ottosee shale" (probably Benbolt), 1 mile west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Tenn.	
D. <i>Pseudolingula</i> ? <i>luttrellensis</i> Cooper, new species.....	216
(6) Brachial view, $\times 2$ , of exterior of holotype, 109286b; (7, 9, 10) respectively side, brachial, and pedicle views, $\times 1$ , of the holotype; (8) exterior of another brachial valve, $\times 1$ , paratype, 109286c; (11, 12) exterior of a large pedicle valve, respectively $\times 2$ and $\times 1$ , paratype, 109286a.	
Moccasin formation, near Luttrell, Luttrell (T.V.A. 155-NW) Quadrangle, Tenn.	
E. <i>Lingulella fostermontiensis</i> (Butts).....	199
(14, 15) Exterior of the pedicle valve, $\times 2$ and $\times 1$ , paratype, 71490a; (13, 16) exterior of a brachial valve, $\times 1$ and $\times 2$ , lectotype 71490b; (17, 18) another well-preserved brachial valve, $\times 1$ and $\times 2$ , hypotype, 109284d.	
Attalla formation (just above red mudstone forming base of Chickamauga), Foster Mountain, $1\frac{1}{4}$ miles northwest of Clay, Leeds (15') Quadrangle, Ala.	
F. <i>Lingulella tenuitesta</i> Cooper, new species.....	205
(19, 20) Respectively the exterior of the brachial and pedicle valves, $\times 4$ , paratype, 109299b, and holotype, 109299a.	
Columbiana formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
G. <i>Lingulella</i> ? <i>glypta</i> Cooper, new species.....	200
(21, 22) Pedicle and brachial views of a small specimen, $\times 2$ , paratype, 116760b;	

- (23) pedicle view,  $\times 1$ , of holotype, 116760a; (24, 25) brachial and pedicle views,  $\times 2$ , of the holotype.  
 Bromide (Pooleville member—*Oxoplecia gouldi* zone, zone 3), Rock Crossing of Hickory Creek, about center of sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.
- H. *Obolus* ? *grandis* Cooper, new species..... 190  
 (26-28) Respectively brachial, side, and pedicle views,  $\times 1$ , of the holotype, 71823. Red Knobs formation, in a marble quarry near Knoxville, Tenn.

## PLATE 2

## ECTENOGLOSSA, LINGULELLA, OBOLUS, SPINILINGULA

- A. *Spinilingula intralamellata* Cooper, new species..... 210  
 (1) Exterior of small pedicle valve,  $\times 6$ , paratype, 109281a; (2) exterior of brachial valve showing ornamentation,  $\times 6$ , paratype, 109281b; (3) another small brachial valve,  $\times 6$ , paratype, 109281c; (4) imperfect pedicle valve,  $\times 6$ , paratype, 109281d; (5) another large pedicle valve,  $\times 6$ , paratype, 109281e.  
 Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- B. *Lingulella* sp. 6..... 208  
 (6, 7) Respectively  $\times 1$  and  $\times 2$  enlargements of a pedicle valve, figured specimen, 109322.  
 Aylmer formation (Rockcliffe member), Aylmer, Quebec Province, Canada.
- C. *Lingulella lirata* Cooper, new species..... 201  
 (8) Exterior of brachial valve,  $\times 2$ , paratype, 109332b; (9) exterior of pedicle valve,  $\times 2$ , paratype, 109332a.  
 Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- D. *Obolus* ? sp. 5..... 193  
 (10, 11) Respectively  $\times 1$  and  $\times 2$  views of the exterior of a pedicle valve, figured specimen, 116772.  
 Effna formation, on Virginia Highway 114, 11 miles east of the junction with Virginia Highway 311, near Haymakertown, Roanoke (15') Quadrangle, Va.
- E. *Ectenoglossa nymphoidea* Cooper, new species..... 218  
 (12, 15) Exterior and side views of a small brachial valve,  $\times 1$ , paratype, 109297b; (14) another small brachial valve showing small patch of external ornamentation at the anterior,  $\times 1$ , paratype, 109297a.  
 Whitesburg formation (50 feet above Lenoir), Morristown Pike (U. S. Highway 11), 1½ miles west of Bulls Gap, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.  
 (16) Brachial valve of medium size,  $\times 1$ , paratype, 109289.  
 Whitesburg formation, from railroad fill, 1½ miles northeast of Bulls Gap, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.  
 (17, 19) Exterior and side views of a large brachial valve,  $\times 1$ , paratype, 71822a. Whitesburg formation, along the railroad east of Bulls Gap, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.  
 (18) Large pedicle (?) valve,  $\times 1$ , paratype, 109292e; (20) another large pedicle valve,  $\times 1$ , the holotype, 109292d.  
 Whitesburg formation, in the railroad cut at Summit Hill School, 1 mile southwest of Otes, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.  
 (13) *Ectenoglossa* cf. *E. nymphoidea* Cooper, new species, exfoliated specimen,  $\times 1$ , figured specimen, 109293.



Edinburg formation (Liberty Hall facies), 300 feet west of Virginia Route 3,  $\frac{3}{4}$  mile northeast of Nineveh, Winchester (15') Quadrangle, Va.

## PLATE 3

## ECTENOGLOSSA, GLOSSELLA, GLYPTOGLOSSA, LINGULELLA, PSEUDOLINGULA

- A. *Glossella* sp. 1..... 229  
 (1) Crushed and incomplete but highly ornamented specimen,  $\times 6$ , figured specimen, 109319.  
 Botetourt formation, junction of Virginia Highways 311 and 114,  $\frac{1}{2}$  mile southwest of Catawba, Salem (15') Quadrangle, Va.
- B. *Ectenoglossa* ? *sculptata* Cooper, new species..... 217  
 (2, 5) Respectively  $\times 1$  and  $\times 2$  views of the brachial valve, holotype 45065; (4) exterior of holotype,  $\times 4$ , showing ornamentation; (3) enlargement,  $\times 8$ , of ornamentation.  
 Camp Nelson formation, opposite the railroad station, High Bridge, Harrodsburg (30') Quadrangle, Ky.
- C. *Ectenoglossa* ? *lyelli* (Billings)..... 217  
 (6, 7) Two brachial valves, respectively holotype, G.S.C. 1027c, and paratype, G.S.C. 1027.  
 Aylmer formation (Rockcliffe member), Allumette Island, Ottawa River, Pontiac County, Ontario, Canada.
- D. *Lingulella* *brainerdi* (Raymond)..... 196  
 (8) Brachial valve,  $\times 1$ , hypotype, 109277f; (10, 11) pedicle valves,  $\times 1$ , hypotypes, respectively 109277c and 109277a; (12) brachial valve showing external ornamentation and traces of the interior muscle marks,  $\times 2$ , hypotype, 109277g.  
 Chazy group (sandstone at base), Isle la Motte, Rouses Point (15') Quadrangle, Vt.  
 (9) Imperfect pedicle valve,  $\times 1$ , hypotype, Carnegie Mus. 5432.  
 Chazy group (base), Valcour Island, Plattsburg (15') Quadrangle, N. Y.
- E. *Glyptoglossa* *cavellosa* Cooper, new species..... 227  
 (13, 14) Brachial and side views of the holotype,  $\times 2$ , 109273; (15) brachial view of holotype,  $\times 1$ ; (18) enlargement of exterior of holotype,  $\times 6$ , showing peculiar pitted surface.  
 Shippensburg formation (Pinesburg member—*Echinospaerites* zone), railroad cut 2 miles southwest of Marion, Chambersburg (15') Quadrangle, Pa.  
 (16) A nearly complete brachial valve,  $\times 2$ , paratype, 109272a; (17, 19) respectively  $\times 1$  and  $\times 2$  views of another brachial valve, paratype, 109272d; (20) ornamentation,  $\times 6$ , of latter specimen.  
 Upper Shippensburg formation (Pinesburg member—lower part of *Nidulites* zone), cut on U. S. Highway 40, on the west side of Conococheague Creek, 7 miles west of Hagerstown, Md.

## PLATE 4

## ECTENOGLOSSA, GLOSSELLA, LINGULELLA

- A. *Glossella* *liumbona* Cooper, new species..... 228  
 (1, 4) Respectively exterior of the pedicle and brachial valves,  $\times 4$ , paratype, 109285; (2) brachial valve of the same specimen,  $\times 6$ , (3) enlargement of part of the pedicle valve of the preceding,  $\times 10$ , to show the ornamentation.  
 Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, about center of sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

	Page
B. <i>Lingulella subparallela</i> Cooper, new species.....	205
(5-7) Brachial, side and pedicle views, $\times 4$ , of the holotype, 109295; (8) anterior half of the pedicle valve of the holotype enlarged, $\times 10$ , to show ornamentation. Effna formation, 1 mile east of Tilson Mill, 16 miles northeast of Marion, Nebo (T.V.A. 223-NW) Quadrangle, Va.	
C. <i>Ectenoglossa ? sculpta</i> Cooper, new species.....	220
(9, 10, 13) Pedicle, side and brachial views of a nearly complete specimen, $\times 1$ , holotype, 109302b; (11) an incomplete pedicle ? valve, $\times 1$ , paratype, 109302a; (12) enlargement of the latter, $\times 4$ , to show ornamentation. Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), branch of Hickory Creek in NW $\frac{1}{4}$ sec. 26, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.	
D. <i>Lingulella rugosilinea</i> Cooper, new species.....	203
(14) Incomplete pedicle valve, $\times 4$ , paratype, 45069c; (15) incomplete brachial valve, $\times 4$ , holotype, 45069b; (16) enlargement of the latter, $\times 10$ , to show details of ornament. Aylmer formation (Rockcliffe), Hogs Back, south of Ottawa, Gloucester Township, Carleton County, Ontario, Canada.	

## PLATE 5

## GLOSSELLA, LINGULELLA, PACHYGLOSSA, PSEUDOLINGULA

A. <i>Lingulella ?</i> sp. 4.....	207
(2, 4) Pedicle and brachial views, $\times 1$ , figured specimen, 109304; (1, 3, 5) pedicle, side and brachial views of the same specimen, $\times 2$ , the brachial view showing the long prominent septum. Arline formation (middle to upper), on Sevierville Pike, 5 miles southeast of Knoxville, Knoxville (T.V.A. 147-NW) Quadrangle, Tenn.	
B. <i>Lingulella</i> sp. 2.....	206
(6) Large pedicle valve, $\times 1$ , figured specimen, 116771. Oil Creek formation (60 feet above basal sand), sec. 12, T. 3 S., R. 3 E., 1 $\frac{3}{4}$ miles northwest of Sylvan, Carter County, Okla.	
C. <i>Lingulella ?</i> sp. 5.....	207
(7, 8) Respectively $\times 1$ and $\times 2$ views of a brachial valve, figured specimen, 109307a. Arline formation, north side of wagon road in glade, $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
D. <i>Pseudolingula ? imperfecta</i> Cooper, new species.....	215
(9, 11) Pedicle and brachial views, $\times 1$ , of the holotype, 109303b; (10) imperfect pedicle valve, $\times 2$ , paratype, 109303d. Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.	
E. <i>Pachyglossa ? elderi</i> (Whitfield).....	225
(12) Plasticine replica of the brachial valve, $\times 1$ , figured specimen, 45015a. Platteville formation ( <i>Vanuxemia</i> bed), Wanamingo, Goodhue County, Minn. (13, 14) Respectively $\times 1$ and $\times 2$ enlargements of an impression of the interior showing muscle marks, figured specimen, 24734a. Platteville formation, Minneapolis, Minn.	
F. <i>Pachyglossa pachydermata</i> Cooper, new species.....	225
(15, 16) Respectively $\times 2$ and $\times 1$ views of an imperfect brachial valve showing the exterior ornamentation, paratype, 116766; (17) pedicle valve, $\times 1$ , of the	

	Page
holotype, 116767; (18) somewhat exfoliated brachial valve, $\times 1$ , paratype, 109337.	
Botetourt formation, roadside at junction Virginia Highways 311 and 114, $\frac{1}{2}$ mile southwest of Catawba, Salem (15') Quadrangle, Va.	
G. <i>Glossella papillosa</i> Cooper, new species.....	229
(19) Interior of pedicle valve, $\times 4$ , paratype, 123305.	
Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
H. <i>Lingulella lirata</i> Cooper, new species.....	201
(20-23) Brachial and side views, $\times 1$ , $\times 2$ , paratype, 109317b; (24, 25) respectively $\times 1$ and $\times 2$ views of the pedicle valve, holotype, 109317a.	
Edinburg formation (Liberty Hall facies—base), about 1 mile northwest of Lexington, Lexington (15') Quadrangle, Va. See pl. 6, D, figs. 16, 17.	
I. <i>Lingulella rideauensis</i> Cooper, new species.....	203
(26) Exterior of pedicle valve, imperfect at the anterior, $\times 1$ , holotype, 109315c; (27, 31) brachial exterior, $\times 1$ and $\times 2$ , paratype, 109315a; (28) brachial exterior, $\times 2$ , paratype, 109324a; (29) exterior of pedicle valve, $\times 1$ , paratype, 109315b; (30) brachial valve showing apical region, $\times 2$ , paratype, 109324c.	
Aylmer formation (Rockcliffe member), Hogs Back, Rideau River, south of Ottawa, Gloucester Township, Carleton County, Ontario, Canada.	

## PLATE 6

## ECTENOGLOSSA, LINGULELLA, PACHYGLOSSA, PLECTOGLOSSA, PSEUDOLINGULA

A. <i>Pachyglossa pachydermata</i> Cooper, new species.....	225
(1, 2, 4) Respectively brachial, side, and pedicle views, $\times 2$ , paratype, 116768; (5) pedicle view, $\times 1$ , of same; (3) plasticine replica of the exterior of the brachial valve, $\times 2$ , of the same paratype.	
Benbolt formation, Tazewell County Farm, 1 mile east of Tazewell, Burkes Garden (15') Quadrangle, Va.	
B. <i>Ectenoglossa</i> cf. <i>E. nymphoidea</i> Cooper, new species.....	218
(6) Exterior of a young, flattened pedicle valve, $\times 1$ , figured specimen, 116778a.	
Paperville formation, $\frac{1}{2}$ mile northwest of Hollins School, Roanoke (15') Quadrangle, Va.	
C. <i>Plectoglossa oklahomensis</i> Cooper, new species.....	222
(7) Exterior of a nearly perfect pedicle valve, $\times 4$ , paratype, 109294; (13, 14) brachial and pedicle views of an imperfect specimen, $\times 2$ , holotype, 116765; (15) brachial view, $\times 4$ , of holotype, showing delthyrial region.	
Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.	
(8) Nearly complete brachial valve, $\times 3$ , paratype, 116764; (9) pedicle valve of a nearly complete specimen, $\times 1$ , paratype, 116763; (10-12) pedicle side, and brachial views, $\times 3$ , of the preceding.	
Bromide formation (Pooleville member, near base), Spring Creek, N $\frac{1}{2}$ sec. 17, R. 2 S., T. 1 W., Murray County, Okla.	
D. <i>Lingulella lirata</i> Cooper, new species.....	201
(16) Plasticine replica of the exterior of the brachial valve, $\times 2$ , holotype, 109317a, figured on pl. 5, H, figs. 24, 25; (17) brachial view, with part of pedicle valve adhering, same as preceding.	
Edinburg formation (Liberty Hall facies—base), about 1 mile northwest of Lexington, Lexington (15') Quadrangle, Va. See pl. 5, H, figs. 24, 25.	

- E. *Pseudolingula ? imperfecta* Cooper, new species..... 215  
 (18,20) Brachial view of an imperfect specimen,  $\times 1$  and  $\times 2$ , paratype, 116762b;  
 (19) brachial view of another specimen showing a nearly perfect posterior portion,  $\times 1$ , paratype, 116762a; (21, 22) brachial and pedicle views,  $\times 2$ , of the same.  
 Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

## PLATE 7

## LINGULELLA, OBOLUS, PACHYGLOSSA, PALAEOGLOSSA

- A. *Pachyglossa biconvexa* Cooper, new species..... 224  
 (1, 2) Internal impression and plasticine replica of brachial interior prepared from the internal impression,  $\times 2$ , paratype, 109271f; (3, 6, 10) pedicle, side, and brachial views of a specimen preserving both valves,  $\times 1$ , holotype, 109271g; (4) brachial view,  $\times 2$ , of the holotype; (5, 8) nearly perfect brachial valve,  $\times 1$ ,  $\times 2$ , paratype, 109271m; (7, 9) respectively  $\times 1$ ,  $\times 2$ , views of the brachial valve, paratype, 109271j; (11, 12) respectively  $\times 1$ ,  $\times 2$ , enlargements of a fine pedicle valve, paratype, 109269a.  
 Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.
- B. *Lingulella galba* Cooper, new species..... 200  
 (13, 14) Respectively  $\times 2$  and  $\times 1$  views of the pedicle valve, holotype, 109282b; (15, 16) the brachial valve,  $\times 1$ , and  $\times 2$ , paratype, 109282a.  
 Bromide formation (Mountain Lake member), middle of east line of sec. 33, T. 2 S., R. 2 E., about 2 miles east of Springer, Carter County, Okla.
- C. *Obolus ? nitens* Cooper, new species..... 190  
 (17, 18) Brachial valves,  $\times 3$ , paratype, 109329b; and holotype, 109329a; (19) the pedicle valve,  $\times 3$ , paratype, 109329d.  
 Lower Rich Valley formation, Porterfield Quarry, 5 miles east of Saltville, Va.
- D. *Lingulella spicata* Cooper, new species..... 204  
 (23, 24) Respectively pedicle and brachial valves,  $\times 2$ , holotype, 109301a, and paratype, 109301b.  
 Whitesburg formation, in the railroad cut at Summit Hill School, 1 mile southwest of Otes, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.
- E. *Obolus ? virginianensis* (Willard)..... 191  
 (20) An imperfect and partially exfoliated brachial valve,  $\times 1$ , paratype, 109335; (21) an imperfect pedicle valve,  $\times 1$ , holotype, 109334; (22) enlargement,  $\times 6$ , of part of the exterior surface of the holotype.  
 Effna formation, paratype from 8 miles southwest of Bland, Bland County, Va.; holotype from lower part of McNutt Quarry, 5 to 6 miles northeast of Ceres, Burkes Garden (15') Quadrangle, Va.
- F. *Palaeglossa ? belli* (Billings)..... 221  
 (25, 26) Respectively  $\times 2$  and  $\times 1$  enlargements of a brachial valve, figured specimen, 109321a; (28) an imperfect pedicle valve,  $\times 1$ , figured specimen, 109321b.  
 Chazy (base of group), Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.  
 (27) Large pedicle valve,  $\times 1$ , lectotype, G.S.C. 1026b.  
 St. Martin formation, Island of Montreal, Quebec, Canada.

- (29) Small but imperfect pedicle valve,  $\times 1$ , figured specimen, Carnegie Mus. 5431.  
 Chazy (base of group), Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.

## PLATE 8

## ECTENOGLOSSA, LINGULELLA, OBOLUS, PLECTOGLOSSA

- |  | Page |
|--|------|
| A. <i>Obolus</i> ? <i>biconvexa</i> Cooper, new species.....   | 189  |
| (1) Pedicle valve, $\times 2$ , holotype, 116788c; (2, 3) two brachial valves, $\times 3$ , paratypes, 116788b, a.<br>Lower Paperville formation, slope just south of the Southern RR. cut 1 mile west of Mosheim, Mosheim (T.V.A. 181-NW) Quadrangle, Tenn.   |      |
| B. <i>Ectenoglossa</i> sp. 1.....  | 220  |
| (4, 5) Two large pedicle (?) valves, $\times 1$ , figured specimens, 116776a, b.<br>Upper Table Head series, Port-au-Port, Newfoundland.   |      |
| C. <i>Lingulella</i> sp. 1.....  | 206  |
| (6) Brachial valve, $\times 2$ , figured specimen, 116769c; (7, 8) respectively $\times 1$ and $\times 2$ enlargements of the pedicle valve, figured specimen, 116769a.<br>Upper Pogonip group ( <i>Anomalorthis</i> zone), Ikes Canyon, east side of Toquima Range, Roberts Mountains (1°) Quadrangle, Nev. |      |
| D. <i>Obolus</i> sp. 1.....  | 192  |
| (9) Imperfect pedicle valve, $\times 2$ , figured specimen, 116789a; (10, 11) two brachial valves, $\times 2$ , figured specimens, 116789b, c.<br>Upper Table Head series, Port-au-Port, Newfoundland.   |      |
| E. <i>Lingulella alabamensis</i> Cooper, new species.....  | 195  |
| (12) Brachial valve, $\times 2$ , showing median ridge, holotype, 109309d; (13) pedicle valve, $\times 2$ , paratype, 109309b.<br>Pratt Ferry formation, 0.2 mile south of Pratt Ferry, Blocton (15') Quadrangle, Ala.   |      |
| F. <i>Lingulella</i> sp. 7.....  | 208  |
| (14) Pedicle valve, $\times 4$ , figured specimen, 109298.<br>Dutchtown formation, Geiser Quarry, 1½ miles east of Dutchtown, Cape Girardeau (15') Quadrangle, Mo.   |      |
| G. <i>Lingulella endopunctata</i> Cooper, new species.....   | 198  |
| (15) Pedicle valve, $\times 4$ , holotype, 109320b; (16) brachial valve, $\times 4$ , paratype, 109320a.<br>Botetourt formation ( <i>Cybeloides</i> bed), ½ mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.   |      |
| H. <i>Lingulella</i> ? sp. 3.....  | 207  |
| (17, 18) Respectively $\times 2$ and $\times 1$ enlargements of a pedicle valve, figured specimen, 109312.<br>Little Oak formation, ½ mile southwest of Newala, Montevallo (15') Quadrangle, Ala.  |      |
| I. <i>Plectoglossa</i> sp. 1.....  | 223  |
| (19, 20) Pedicle and brachial views of a strongly ornamented linguloid, $\times 3$ , figured specimen, 116774.<br>Benbolt formation, 0.2 mile south of the middle fork of Moccasin Creek, 1½ miles due south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.                                     |      |
| J. <i>Ectenoglossa</i> ? <i>rubra</i> Cooper, new species.....   | 219  |
| (21-23) Pedicle, brachial, and side views of an imperfect specimen with both valves in contact, $\times 1$ , paratype, 116777b; (24, 25) side and brachial views of a  |      |

large brachial valve,  $\times 1$ , holotype, 116777a; (26) part of the ornamentation,  $\times 3$ , of the holotype.

Bays formation, 0.2 mile northeast of Fourmile Church, 1.1 miles south-south-east of Wellsville, Tallassee (T.V.A. 139-SE) Quadrangle, Tenn.

## PLATE 9

ACANTHAMBONIA, DICTYONITES, GLOSSELLA, LINGULELLA, OBOLUS,  
PALAEOGLOSSA, TORYNELASMA

- A. *Acanthambonia virginiensis* Cooper, new species..... 213  
 (1) Exterior view of a brachial valve showing long spines,  $\times 10$ , paratype, 116797c; (2, 4) respectively exterior views of a brachial and pedicle valve,  $\times 10$ , paratypes, 116797b and 116797d; (3, 6) exterior and interior of a well-preserved brachial valve,  $\times 10$ , holotype, 116797e; (5) interior of the pedicle valve,  $\times 10$ , paratype, 116797a.  
 Botetourt formation, east side of the road, 0.2 mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.
- B. *Lingulella* ? sp. 8..... 208  
 (7, 8) Exterior and interior of a brachial valve,  $\times 5$ , figured specimen, 116779.  
 Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- C. *Torynelasma toryniferum* Cooper, new species..... 258  
 (9, 10) Respectively pedicle interior showing the peculiar spoonlike plate and posterior view of a pedicle valve,  $\times 10$ , holotype and paratype, 116825c and 116825d.  
 Pratt Ferry formation (lower 3 feet), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- D. *Dictyonites perforata* Cooper, new species..... 188  
 (11, 12) Exterior of imperfect brachial valves showing smooth apical region,  $\times 10$ , paratypes, 116830b and 116830c; (13) exterior of the pedicle valve showing the large homoeodeltidium and cleft apex,  $\times 10$ , paratype, 116830a.  
 Horizon and locality same as preceding.
- E. *Lingulella decorticata* Cooper, new species..... 198  
 (14, 15) Exterior of the pedicle and brachial valves of a complete specimen with valves slightly displaced,  $\times 2$ , holotype, 116757.  
 Elway formation,  $\frac{1}{4}$  mile east of Belfast Mill, Saltville (T.V.A. 212-NE) Quadrangle, Va.
- F. *Obolus* ? sp. 3..... 193  
 (16) Exterior of a large and thick-shelled species having strong concentric elevated lines,  $\times 3$ , figured specimen, 116791a.  
 Pratt Ferry, formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- G. *Palaeglossa mysticensis* Cooper, new species..... 221  
 (17, 18) Exterior of somewhat exfoliated pedicle and brachial valves,  $\times 2$ , respectively holotype, 66285a, and paratype, 66285b; (19) exfoliated brachial valve showing the median ridge,  $\times 2$ , paratype, 66285c.  
 Mystic conglomerate, Range 6, Lot 20, near Mystic, Stanbridge Township, Quebec, Canada.
- H. *Obolus* ? sp. 4..... 193  
 (20, 21) Interior and exterior of a well-preserved but incomplete specimen showing hinge region and pitted exterior,  $\times 10$ , figured specimen, 116792b; (22) interior of another brachial valve,  $\times 10$ , figured specimen, 116792a.  
 Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.

	Page
I. <i>Glossella liumbona</i> Cooper, new species.....	228
(23-25) Respectively pedicle, side, and brachial views of the exterior showing fine papillae, $\times 4$ , paratype, 116786. Bromide formation (Pooleville member—bed 5), Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.	
J. <i>Glossella papillosa</i> Cooper, new species.....	229
(26, 27) Exterior and interior views of the pedicle valve showing apical structures and ornamentation, $\times 5$ , holotype, 116787b. Compare with <i>Spinilingula</i> , pl. 11. Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	

## PLATE 10

## DICTYONITES, EOCONULUS, LINGULELLA, PALAEOGLOSSA

A. <i>Dictyonites perforata</i> Cooper, new species.....	188
(1, 2) Exterior and posterior views of a pedicle valve showing the cleft apex and the large arched homoeodeltidium, $\times 10$ , paratype, 116830j; (3, 4) same views of another and larger pedicle valve, $\times 10$ , holotype, 116830-1; (5) exterior of a well-preserved brachial valve showing smooth apex, $\times 10$ , paratype, 116830i; (6, 7) interior and exterior of a large brachial valve showing apex and simple structures of the interior, $\times 10$ , paratype, 116830k; (8) posterior view of a pedicle valve showing the strongly arched homoeodeltidium, $\times 15$ , paratype, 116830d; (9) interior of a poorly preserved pedicle valve showing a median ridge near the apex, $\times 12$ , paratype, 116830h; (10) interior, $\times 12$ , of paratype, 116830d, showing short median septum. Pratt Ferry formation (lower 3 feet), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
B. <i>Eoconulus rectangulatus</i> Cooper, new species.....	283
(11, 12) Posterior and side views of the brachial valve, $\times 10$ , holotype, 116840a; (13) interior of another brachial valve showing large lateral muscle scars and a median callosity, $\times 10$ , paratype, 116840b. Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
C. <i>Palaeglossa</i> sp. 1.....	222
(14, 15) Pedicle and brachial views of the exfoliated shell, $\times 1$ , figured specimen, 116775; (16, 17) same views, $\times 2$ , showing septum in brachial valve. Edinburg formation ( <i>Cyrtonotella</i> zone), 100 yards west of U. S. Highway 11, 1 mile northeast of Strasburg, Strasburg (15') Quadrangle, Va.	
D. <i>Lingulella fostermontensis</i> (Butts).....	199
(18, 19) Respectively $\times 1$ and $\times 2$ views of a large brachial valve, hypotype, 116759c; (20, 21) another and larger brachial valve than the preceding, respectively $\times 1$ and $\times 2$ , showing the concentric ornamentation, hypotype, 116759b; (22) a large pedicle valve, $\times 2$ , hypotype, 116759a. Rocks of Blackford facies = Attalla formation (at base), west base of Foster Mountain, Birmingham Quadrangle, Ala.	

## PLATE 11

## GLOSSELLA, LINGULELLA, OBOLUS, PACHYGLOSSA, SCHIZOTRETA, SPINILINGULA, TREMATIS, WESTONIA

A. <i>Obolus</i> ? sp. 3.....	193
(1) Exterior of a fragment of the posterior part of a brachial valve, $\times 4$ , showing concentric ornamentation, figured specimen, 116791b.	

	Page
Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
B. <i>Lingulella lirata</i> Cooper, new species.....	201
(2, 3) Interior of imperfect pedicle valve, respectively $\times 6$ and $\times 8$ , showing apical structures, paratype, 116761a; (4) posterior of the brachial valve showing the apical structures, $\times 8$ , paratype, 116761b.	
Horizon and locality same as preceding.	
C. <i>Schizotreta willardi</i> Cooper, new species.....	281
(5) Fragment showing the apical foramen of the pedicle valve, $\times 5$ , paratype, 116806g.	
Horizon and locality same as preceding.	
D. <i>Obolus</i> ? sp. 4.....	193
(6, 7) Interior and exterior of an imperfect specimen, $\times 4$ , figured specimen, 116792c; (8) exterior of same specimen, $\times 8$ , showing rows of pores.	
Horizon and locality same as preceding.	
E. <i>Westonia superba</i> Cooper, new species.....	209
(9, 10) Exterior and interior of the brachial valve, $\times 4$ , showing ornamentation and apical structures, holotype, 116780b.	
Horizon and locality same as preceding.	
F. <i>Pachyglossa dorsiconvexa</i> Cooper, new species.....	225
(11) Exterior and side view of the brachial valve, showing the strong convexity, $\times 2$ , holotype, 116758a.	
Horizon and locality same as preceding.	
G. <i>Glossella papillosa</i> Cooper, new species.....	229
(12, 13) Exterior and interior views of the brachial valve, $\times 4$ , showing apical structures, paratype, 116787d; (14) fragment showing papillae on exterior, $\times 10$ , paratype, 116787e.	
Horizon and locality same as preceding.	
H. <i>Trematis elliptopora</i> Cooper, new species.....	271
(15, 16) Exterior and interior of the pedicle valve showing the pedicle notch, $\times 3$ , paratype, 116809d; (17, 20) exterior and interior of an imperfect brachial valve, $\times 4$ , showing pores and apical structures, holotype, 116809c; (18, 19) same views of another fragmentary brachial valve showing apical structures, $\times 5$ , paratype, 116809a; (21) apical view of another brachial valve showing smooth apex, $\times 4$ (specimen lost).	
Horizon and locality same as preceding.	
I. <i>Trematis</i> ? <i>spinosa</i> Cooper, new species.....	274
(22, 23) Exterior and interior of the brachial valve showing the spines clustered at the apex, respectively $\times 6$ and $\times 10$ , holotype, 116810; (24) interior of another brachial valve showing apical plate and spines, $\times 10$ (specimen lost).	
Horizon and locality same as preceding.	
J. <i>Spinilingula intralamellata</i> Cooper, new species.....	210
(25, 26) Exterior views of two brachial valves showing the lamellose and spinose ornamentation, $\times 10$ , respectively holotype, 116784a, and paratype, 116784b; (27) small pedicle valve seen from the exterior, $\times 6$ , paratype, 116784c; (28) pedicle valve from the exterior $\times 6$ , paratype, 116784d; (29, 30) interior of the apical ends of the pedicle valve, $\times 10$ , showing deep pedicle groove and bounding plates, paratypes, 116784e, 116784f; (31, 32) interior views of the brachial valve, $\times 10$ , showing apical plate, paratypes, 116784g and 116784h.	
Horizon and locality same as preceding.	



## PLATE 12

## LEPTOBOLUS, LINGULASMA

- A. *Leptobolus insignis* Hall..... 214  
 (1) Pedicle exterior,  $\times 8$ , figured specimen, 71887a; (2) pedicle interior showing ridges,  $\times 8$ , figured specimen, 71887b; (3) brachial exterior,  $\times 8$ , figured specimen, 71887c; (4) brachial interior showing anterior median ridge,  $\times 8$ , figured specimen, 71887d.  
 Eden (Fulton), St. Thomas, Ky.
- B. *Leptobolus lepis* Hall..... 214  
 (5) Brachial interior,  $\times 8$ , figured specimen, 45239b; (6) interior of the pedicle valve,  $\times 8$ , figured specimen, 45239a.  
 Trenton (Cynthiana), West Covington, Ky.
- C. *Leptobolus* ? sp. 1..... 214  
 (7) Pedicle valve,  $\times 4$ , figured specimen, 109344a; (8) brachial valve,  $\times 4$ , figured specimen, 109344b.  
 Edinburg formation (Liberty Hall facies), Middle River, 4 miles north-northeast of Staunton, Staunton (15') Quadrangle, Va.
- D. *Lingulasma matutinum* Cooper, new species..... 233  
 (10) Imperfect specimen  $\times 1$ , paratype, 109348c; (11) imperfect specimen preserving some of the original shell surface,  $\times 2$ , holotype, 109348a; (9) enlargement,  $\times 10$ , of part of surface of holotype.  
 Arline formation, north side of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- E. *Lingulasma oklahomense* Cooper, new species..... 233  
 (13) Brachial valve,  $\times 1$ , showing cavity left by impression of platform on mud filling, holotype, 109353b; (14) a specimen similar to the preceding showing the same feature,  $\times 1\frac{1}{2}$ , paratype, 109352d; (15) brachial valve not so deformed as the preceding ones,  $\times 1$ , paratype, 109352e; (12) ornamentation,  $\times 3$ , of the preceding; (16) imperfect specimen with well-preserved ornamentation,  $\times 1$ , paratype, 109353a; (17) enlargement,  $\times 10$ , of the ornamentation of the preceding specimen.  
 Bromide formation (Pooleville member—*Oxoplectia gouldi* zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.
- F. *Lingulasma compactum* Cooper, new species..... 232  
 (18, 19) Views of both valves (impossible to say which is pedicle),  $\times 1$ , holotype, 109347; (20) the ornamentation of holotype,  $\times 4$ , showing closely crowded lines; (21) same,  $\times 8$ .  
 Oranda formation, 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.

## PLATE 13

## GLOSSELLA, GLYPTOGLOSSA, LINGULASMA, OBOLELLINA, ORBICULOIDEA, SCHIZAMBON

- A. *Obolellina magnifica* Billings..... 231  
 (1) Brachial exterior,  $\times 1$ , hypotype, 116800b; (2) exterior of pedicle valve,  $\times 1$ , hypotype, 116800a; (3) interior of brachial valve showing callosites,  $\times 1$ , hypotype, 116800d.  
 Rockland formation, Bonnechère River, 1 mile below Eganville, Ontario, Canada.
- B. *Glyptoglossa* sp. 1..... 227  
 (4) Silicified but imperfect pedicle valve,  $\times 2$ , figured specimen, 116770.

	Page
Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Bland County, Va.	
C. <i>Orbiculoidea eximia</i> Cooper, new species.....	275
(5) Large brachial valve, $\times 1$ , paratype, 117953a. Bromide formation (Pooleville member— <i>Oxoplectra gouldi</i> zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.	
D. <i>Schizambon</i> cf. <i>S. duplicimuratum</i> Hudson.....	266
(6) Interior of pedicle valve, $\times 4$ , figured specimen, 117954. St. Martin formation, $\frac{1}{2}$ mile north of Cap St. Martin, Quebec, Canada.	
E. <i>Glossella liumbona</i> Cooper, new species.....	228
(7, 8) Brachial and pedicle views, $\times 1$ , of the holotype, 116785a; (9, 10) pedicle and brachial views, $\times 2$ , of the holotype; (11) enlargement, $\times 5$ , of part of shell of holotype; (12) brachial view of a partially exfoliated specimen showing faint median ridge, $\times 2$ , paratype, 116785b. Bromide formation (Pooleville member— <i>Oxoplectra gouldi</i> zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.	
F. <i>Lingulasma occidentale</i> Cooper, new species.....	234
(13) Anterior part of an incomplete specimen, $\times 1$ , paratype, 116793a; (14) incomplete specimen with beaks broken away, $\times 1$ , holotype, 116793b; (15, 16) brachial and pedicle views of the posterior part of a specimen with both valves in contact, $\times 1$ , paratype, 117955; (17) enlargement, $\times 10$ , of part of the shell surface of holotype. Yellow limestone above 25-foot sandstone of Eureka group, 3 miles north of Martin Ranch on southwest side of hill 8167, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.	

## PLATE 14

## SCHIZAMBON, SIPHONOTRETA

A. <i>Siphonotreta americana</i> Cooper, new species.....	263
(1, 9) Pedicle exterior, respectively $\times 2$ and $\times 3$ , paratype, 109636g. The specimen shown in fig. 9 is tipped to show the foramen. (2, 8) hinge area of brachial valve, showing thickened rim, $\times 2$ and $\times 3$ , paratype, 109636e; (3) exterior of preceding, $\times 2$ ; (4, 11) exterior of brachial valve, respectively $\times 2$ and $\times 4$ , to show spines, paratype, 109636b; (6) pedicle exterior showing small foramen, $\times 2$ , paratype, 109636d; (7, 10) exterior and side views of another pedicle valve, $\times 2$ , holotype, 109636f. Arline formation, north side of wagon road in glade, $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
(5) Pedicle exterior, $\times 2$ , paratype, 109635. Locality same as preceding but from the upper 25 feet of the Arline formation.	
B. <i>Schizambon subradiatum</i> Cooper, new species.....	269
(12) Imperfect pedicle exterior showing long foraminal slit, $\times 2$ , paratype, 109686e; (17, 18) side and exterior views of the pedicle valve, $\times 2$ , holotype, 109686c; (16) enlargement, $\times 3$ , of holotype; (13) foramen, $\times 6$ , of holotype; (15) imperfect brachial valve, $\times 2$ , paratype, 109686d; (14, 19) a nearly perfect brachial valve preserving the spines, respectively $\times 2$ and $\times 3$ , paratype, 109686g. Horizon and locality same as A above.	
C. <i>Schizambon irregulare</i> Cooper, new species.....	267
(20, 21) Brachial valve, $\times 3$ and $\times 1$ , holotype, 109669.	

- |   | Page |
|---|------|
| Arline formation, Sevierville Pike, 3 miles southeast of Knoxville, Knoxville (T.V.A. 147-NW) Quadrangle, Tenn. |      |
| D. <i>Schizambon lineatum</i> Cooper, new species.....  | 267  |
| (22, 23) Brachial valve, $\times 1$ , $\times 2$ , holotype, 109671.  |      |
| Wardell formation, 1 mile northeast of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.                     |      |

## PLATE 15

## SCHIZAMBON

- |   |     |
|---|-----|
| A. <i>Schizambon macrothyris</i> Cooper, new species.....   | 267 |
| (2-4) Brachial, pedicle, and side views, $\times 1$ , of the holotype, 98204a; (1) pedicle view, $\times 2$ , of holotype.  |     |
| Wardell formation, Lloyd Carter's barn, $\frac{3}{4}$ mile by road northeast of school at Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.  |     |
| B. <i>Schizambon duplicimuratum</i> Hudson.....   | 266 |
| (5, 6) Pedicle and brachial valves, $\times 4$ , A.M.N.H. (no number).  |     |
| Crown Point formation, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.   |     |
| C. <i>Schizambon perspinosum</i> Cooper, new species.....   | 268 |
| (7) Brachial interior, $\times 2$ , paratype, 109678.   |     |
| Bromide formation (Pooleville member—zone 5), Spring Creek, N $\frac{1}{2}$ sec. 17, T. 2 S., R. 1 W., Murray County, Okla.   |     |
| (8) Pedicle exterior, $\times 2$ , holotype, 109681c; (9, 11) respectively side and exterior views of a brachial valve, $\times 1$ , paratype, 109681d; (16) same as preceding, enlarged $\times 2$ ; (10, 14) pedicle valve, $\times 2$ , $\times 1$ , paratype, 71891a; (13) brachial valve, $\times 1$ , paratype, 109681a; (17) enlargement, $\times 4$ , of part of preceding showing long spines; (15) brachial valve, $\times 2$ , paratype, 109680. |     |
| Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.   |     |
| (12) Interior of a pedicle valve showing track of apical plate, $\times 2$ , figured specimen, 109688.  |     |
| Near top of brownish granular beds of Bromide formation (Mountain Lake member), same locality as preceding.   |     |
| D. <i>Schizambon hirsutum</i> Cooper, new species.....  | 266 |
| (18, 19) Brachial valve, $\times 1$ and $\times 3$ , holotype, 109670a.   |     |
| Murat formation, along road and ridge, Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.   |     |
| E. <i>Schizambon cuneatum</i> Willard.....  | 265 |
| (20, 22) Brachial valve, $\times 2$ and $\times 1$ , showing long spines, holotype, 109668.   |     |
| Effna formation, McNutt Quarry, 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.  |     |
| (21) Exterior of the pedicle valve, $\times 1\frac{1}{2}$ , cast of holotype, M.C.Z. 8588.  |     |
| Horizon and locality same as preceding.   |     |

## PLATE 16

## CONOTRETA, SPONDYLOTRETA

- |  |     |
|--|-----|
| A. <i>Conotreta ? alta</i> Cooper, new species.....  | 248 |
| (1-3) Posterior, apical, and anterior views of the pedicle valve, $\times 4$ , holotype, 109715. |     |

	Page
Arline formation, north side of wagon road in glade, $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
B. <i>Conotreta cuspidata</i> Cooper, new species.....	250
(4, 5, 7) Respectively anterior, side, and posterior views of the pedicle valve, $\times 4$ , holotype, 109716a; (6) imperfect brachial valve, $\times 4$ , paratype, 109716b. Effna formation, Porterfield Quarry, 5 miles due east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.	
C. <i>Spondylotreta ? declivis</i> (Willard).....	256
(8-10) Apical, side, and posterior views of the pedicle valve, $\times 4$ , hypotype, 109727a. Effna formation, McNutt Quarry, 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.	
D. <i>Conotreta magna</i> Cooper, new species.....	252
(11, 14) Side and posterior views of a large pedicle valve, $\times 2$ , paratype, 109732b; (15) side view of same, $\times 1$ , posed with apex vertical; (16) brachial valve, $\times 3$ , paratype, 109732a. Whitesburg formation (cobble <i>Ampyx</i> and <i>Isotelus</i> beds 0 to 50 feet above the Lenoir), on Morristown road, U. S. Highway 11, $1\frac{1}{2}$ miles west of Bulls Gap, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn. (12, 13, 17) Side, anterior, and posterior views of a larger pedicle valve, $\times 2$ , holotype, 109733. Whitesburg formation (lower 50 feet), 2 miles southwest of Bulls Gap, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.	
E. <i>Conotreta gigantea</i> Cooper, new species.....	251
(18) Apical view of an exfoliated specimen showing foramen and pallial trunks, $\times 3$ , paratype, 109734e; (19, 21-23) posterior, apical, side, and anterior views of a well-preserved pedicle valve, $\times 3$ , holotype, 109734b; (20) partial impression of a brachial interior showing the median ridge, $\times 3$ , paratype, 109734c. Pratt Ferry formation (lower 3 feet), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
F. <i>Conotreta plana</i> Cooper, new species.....	254
(24-27) Posterior, apical, anterior, and side views of a nearly perfect pedicle valve, $\times 4$ , holotype, 109735b. Effna formation, Porterfield Quarry, 5 miles due east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.	
G. <i>Conotreta multisinuata</i> Cooper, new species.....	253
(29, 30, 35) Posterior, side, and anterior views of a pedicle valve, $\times 6$ , paratype, 109742f; (31) brachial interior impression, $\times 6$ , paratype, 109742p; (36) apical view of an exfoliated pedicle valve showing foramen cast and impressions of pallial trunks, $\times 6$ , paratype, 109742h; (40) apical part of pedicle interior, $\times 6$ , paratype, 109742r. Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Va. (32-34) Apical, anterior, and side views of an exfoliated pedicle valve showing pallial trunks, $\times 6$ , paratype, 109739a. Botetourt formation, 2 miles south of Albany, Mosheim (T.V.A. 181-NW) Quadrangle, Tenn. (28) Apical view of a silicified specimen showing the tiny apical foramen, $\times 8$ , paratype, 109746b; (37) pedicle interior showing preforaminal callosity and pallial trunks, $\times 8$ , holotype, 109746a; (38, 39) brachial interiors, $\times 10$ , paratypes, 109746c, d. Specimen shown in fig. 38 is tipped slightly to the observer's right to show the apex of the median septum. Edinburg formation (lower Liberty Hall facies), field northwest of U. S.	

Highway 11,  $\frac{3}{4}$  miles southwest of Lacey Springs, Broadway (15') Quadrangle, Va.

- H. *Conotreta rusti* Walcott..... 254  
 (41) Anterior view of an exfoliated pedicle valve showing the pallial trunks,  $\times 4$ , lectotype, 18443a.  
 Trenton limestone, Trenton Falls, N. Y.

## PLATE 17

## EPHIPPELASMA, CONOTRETA

- A. *Ephippelasma minutum* Cooper, new species..... 261  
 (1, 3) Side view of a complete individual with the anterior portion broken away to show the saddle-shaped plate in place,  $\times 20$  (ca.), holotype, 116821a; (2) same specimen,  $\times 10$ , before the side was broken; (4) side view of a complete specimen, ca.  $\times 8$ , paratype, 116821b; (5) posterior view of a pedicle valve, ca.  $\times 20$ , showing the tiny apical foramen, paratype, 116821c; (6) posterior view of another pedicle valve,  $\times 8$ , paratype, 116821d; (7) exterior of the brachial valve, ca.  $\times 20$ , paratype, 116821e (specimen lost); (8) interior of the brachial valve showing the peculiar saddle-shaped plate, ca.  $\times 20$ , paratype, 116821f; (12) anterior view of the interior of the same brachial valve showing saddle-shaped plate from below, ca.  $\times 10$ ; (9) interior of the brachial valve with part of pedicle valve still in place and showing position of saddle-shaped plate, ca.  $\times 20$ , paratype, 116821g; (10, 11) broken specimen seen from the side and showing saddle-shaped plate in relation to the pedicle valve, respectively ca.  $\times 20$  and  $\times 10$ , paratype 116821h; (13, 14) side and posterior views of the interior of the brachial valve showing saddle-shaped plate in profile and from above, ca.  $\times 10$ , paratype, 116821i.  
 Pratt Ferry formation (lower 3 feet), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- B. *Conotreta apicalis* Cooper, new species..... 249  
 (15-18) Respectively apical, posterior side, and anterior views of a pedicle valve,  $\times 4$ , holotype, 116813a; (19-20) side, posterior, and apical views of another pedicle valve smaller than the preceding,  $\times 4$ , paratype, 116813b; (21, 22) interior and exterior of a brachial valve,  $\times 4$ , paratype, 116813c; (23, 24) side and interior views of a brachial valve showing median septum,  $\times 4$ , paratype, 116813d; (25, 26) brachial interior and same tilted to the side to show the median septum,  $\times 4$ , paratype, 116813e; (27) interior of another brachial valve showing muscle scars,  $\times 4$ , paratype, 116813f; (28) brachial interior showing muscle scars,  $\times 4$ , paratype, 116813g.  
 Horizon and locality same as preceding.
- C. *Conotreta depressa* Cooper, new species..... 251  
 (29-31) Respectively posterior, side, and exterior views of an imperfect pedicle valve,  $\times 2$ , paratype, 116815a; (32-34) respectively exterior, side, and posterior views of another pedicle valve,  $\times 4$ , paratype, 116815g; (35, 36, 37) stout, small pedicle valve referred to this species doubtfully,  $\times 4$ , figured specimen, 117967; (38) interior of a pedicle valve showing the pallial markings,  $\times 3$ , paratype, 116815d; (39, 40) respectively  $\times 2$  and  $\times 4$  views of a pedicle interior showing apical callosity, muscle scars, and pallial marks, holotype, 116815e; (41, 42) the same interior in normal view,  $\times 2$  and  $\times 4$ ; (43) interior of the pedicle valve showing callosity at apex,  $\times 4$ , interior of paratype, 116815a; (44) interior of an imperfect pedicle valve showing the apical callosity and pallial marks in exceptional detail,  $\times 4$ , paratype, 116815f; (45) exterior view of a pedicle valve,  $\times 2$ , paratype, 116815b; (47-49) exterior, tilted, and interior views of an

other brachial valve showing the median septum and muscle scars,  $\times 3$ , paratype, 116815c; (50, 51) interior and exterior of a small brachial valve,  $\times 3$ , paratype, 116815i; (46, 52) side and interior views of a nearly perfect brachial valve,  $\times 3$ , paratype, 116815j; (53) interior of a large but fragmentary brachial valve showing elaborately developed pallial marks,  $\times 3$ , paratype, 116815k; (54, 55) interiors of fragmentary brachial valves showing details of the muscle scars and pallial marks,  $\times 4$ , paratypes, 116815h and 116815-1; (56, 57) interior and exterior of a large brachial valve,  $\times 3$ , showing muscle scars, paratype, 116815m.

Horizon and locality same as preceding.

- D. *Conotreta gigantea* Cooper, new species..... 251  
 (58) Under side of posterior of a large pedicle valve,  $\times 2$ , showing part of pedicle groove and elongate muscle tracks, paratype, 117968a.  
 Horizon and locality same as preceding.
- E. *Conotreta gigantea* Cooper, new species..... 251  
 (59) Interior of a brachial valve showing low median septum and muscle scars,  $\times 3$ , paratype, 117968b; (60) posterior of another but imperfect brachial valve showing triangular pit and muscle scars,  $\times 3$ , paratype, 117968c.  
 Horizon and locality same as preceding.

#### PLATE 18

ACANTHAMBONIA, CONOTRETA, PATERULA, RHYSOTRETA, SCAPHIELASMA, SPONDYLOTRETA,  
 TORYNELASMA, UNDIFFERINA

- A. *Spondylotreta concentrica* Cooper, new species..... 255  
 (1, 2) Exterior and interior of the brachial valve,  $\times 6$ , paratype, 116826c; (3-6) respectively side, posterior, apical, and interior views of the pedicle valve,  $\times 4$ , holotype, 116826a; (7) interior of another pedicle valve showing the spondylium-like apical structure, ca  $\times 10$ , paratype, 116826b.  
 Pratt Ferry formation (lower 3 feet), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- B. *Undiferina rugosa* Cooper, new species..... 263  
 (8, 9) Exterior and interior of the brachial valve,  $\times 4$ , paratype, 116832a; (20) interior of the same specimen,  $\times 6$ , showing apical structure and median septum; (10, 11) posterior and exterior views of another brachial valve,  $\times 4$ , holotype, 116832b; (12, 13) interior of holotype,  $\times 4$  and  $\times 8$ , showing expanded tip of median septum; (15) exterior of the holotype,  $\times 8$ , showing the strongly wrinkled surface; (14) interior of a brachial valve tilted slightly to show the median septum and its expansion in partial profile,  $\times 8$ , paratype, 116832c; (18) same specimen in normal interior view,  $\times 4$ ; (16) same as preceding in exterior view,  $\times 6$ , to show the wrinkled surface; (17) imperfect brachial valve with no expansion of the septum,  $\times 6$ , paratype, 116832d; (19, 21) imperfect brachial valves showing an expanded and a tubular end on the median septum,  $\times 6$ , paratypes, 116832e and 116832f.  
 Horizon and locality same as preceding.
- C. *Conotreta ? concentrica* Cooper, new species..... 250  
 (22) Apical view of an imperfect pedicle valve,  $\times 4$ , showing the minute foramen, holotype, 116814.  
 Horizon and locality same as preceding.
- D. *Acanthambonia minutissima* Cooper, new species..... 212  
 (23) Interior of the brachial valve showing the apical structure,  $\times 10$ , paratype, 116795a; (25) posterior part of the same specimen,  $\times 15$ , showing the broad apical plate; (24) interior of the pedicle valve showing delthyrium,  $\times 10$ , holo-

Page

type, 116795b; (26) posterior of same,  $\times 15$ ; (27) exterior of the brachial valve showing the spines,  $\times 10$ , paratype, 116795c.

Horizon and locality same as preceding.

- E. *Torynelasma toryniferum* Cooper, new species..... 258  
 (28, 29) Exterior and interior of a nearly perfect brachial valve,  $\times 10$ , paratype, 116824c; (30) same specimen showing spoon on median septum,  $\times 4$ ; (35, 36) side and tilted views of the preceding,  $\times 8$ , showing septum and spoon; (31-33) posterior, side, and anterior views of the pedicle valve,  $\times 4$ , paratype, 116824a; (34) another, but slightly damaged, pedicle valve,  $\times 4$ , paratype, 116824b.  
 Horizon and locality same as preceding.
- F. *Rhysotreta corrugata* Cooper, new species..... 259  
 (37-40) Respectively apical, posterior, anterior, and side views of a pedicle valve,  $\times 10$ , showing fairly large apical foramen and corrugated ornamentation, holotype, 116817a; (41) exterior of the brachial valve,  $\times 10$ , paratype, 116817b; (42) young pedicle valve in apical view showing the large foramen, ca.  $\times 20$ , paratype, 116817c; (43, 44) interior and side view of the brachial valve,  $\times 10$ , showing septum, paratype, 116817d; (45, 46) brachial valve tilted to side to show septum, and same specimen in posterior view,  $\times 10$ , paratype, 116817e; (50) exterior,  $\times 8$ , of the same brachial valve as preceding; (47, 49) side and interior views of an old brachial valve showing septum and muscle scars,  $\times 8$ , paratype, 116817f; (48) posterior view of a large pedicle valve,  $\times 10$ , showing elongate smooth track and foramen, paratype, 116817g (specimen broken in photographing).  
 Horizon and locality same as preceding.
- G. *Conotreta ? altirostra* Cooper, new species..... 248  
 (51-53) Anterior, side, and posterior views of a pedicle valve,  $\times 4$ , holotype, 116812.  
 Botetourt formation, in the field on the south side of the road 0.2 mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.
- H. *Paterula perfecta* Cooper, new species..... 238  
 (54) Exterior of the brachial valve showing the small apex,  $\times 4$ , paratype, 116799b; (55) exterior of the pedicle valve showing the notch at the apex,  $\times 4$ , paratype, 116799c; (56) posterior portion of pedicle valve showing notch and traces of muscle marks,  $\times 10$ , paratype, 116799a.  
 Pratt Ferry formation (lower 3 feet), 0.2 mile northeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- I. *Torynelasma minor* Cooper, new species..... 257  
 (57, 58) Side and anterior views of a pedicle valve,  $\times 8$ , paratype, 116823d; (59) interior of an imperfect brachial valve showing short spoon and high septum,  $\times 20$ , paratype, 116823c; (60, 62, 64) side, tilted, and normal interior views of a brachial valve showing the spoon and muscle marks,  $\times 20$ , holotype, 116823a; (61, 63) another brachial valve smaller than the preceding,  $\times 20$ , paratype, 116823b.  
 Horizon and locality same as preceding.
- J. *Scaphelasma septatum* Cooper, new species..... 260  
 (65, 66) Respectively enlargement of the apical region and exterior view of a pedicle valve showing foramen,  $\times 10$ ,  $\times 20$ , holotype, 116819a; (67) posterior view of another pedicle valve showing foramen and groove posterior to it,  $\times 10$ , paratype, 116819b; (68) side view of the pedicle valve,  $\times 10$ , paratype, 116819c; (69) inside of a pedicle valve showing pedicle tube,  $\times 10$ , paratype, 116819d; (70) interior of the brachial valve showing the median septum,  $\times 10$ , paratype, 116819e; (71) brachial valve in interior view tilted to side to show septum in partial profile,  $\times 10$ , paratype, 116819f; (72) full view of another brachial inte-

rior showing the apical plate,  $\times 10$ , paratype, 116819g; (73) exterior of the brachial valve showing elevated beak and concentric lines,  $\times 10$ , paratype, 116819h. Horizon and locality same as preceding.

## PLATE 19

## SCHIZOCRANIA, SCHIZOTRETA, TREMATIS

- A. *Schizotreta willardi* Cooper, new species..... 281  
 (1) Exterior view of exfoliated brachial valves,  $\times 2$ , paratype, 109697g; (2) moderately well preserved brachial valve showing exterior,  $\times 2$ , holotype, 109697b; (3, 4) brachial exterior,  $\times 2$ , respectively a replica of the exterior made from an impression and the counterpart of the impression, paratypes, 109697e, f; (5) exfoliated pedicle valve,  $\times 2$ , paratype, 109697c; (6) somewhat exfoliated pedicle valve showing foramen track,  $\times 2$ , paratype, 109660a.  
 Pratt Ferry formation, 0.2 mile south of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- B. *Schizotreta shuleri* (Willard)..... 280  
 (7) Brachial valve showing ornamentation well,  $\times 2$ , hypotype, 109699c; (8, 9) side and apical views of a partially exfoliated pedicle valve,  $\times 2$ , hypotype, 109699a.  
 Rich Valley formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- C. *Trematis* sp. 3..... 275  
 (11) Imperfect brachial valve,  $\times 3$ , figured specimen, 109704, (10) enlargement of same,  $\times 6$ , showing external pits.  
 Lower Edinburg (*Cyrtototella* zone),  $\frac{1}{8}$  mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.
- D. *Trematis foerstei* Cooper, new species..... 271  
 (18, 15) Pedicle valve,  $\times 1$  and  $\times 2$ , holotype, 109707d; (16) plasticine replica of the exterior of a pedicle valve,  $\times 1$ , paratype, 109709a; (17) the brachial valve,  $\times 1$ , paratype, 109709d; (19) ornamentation, enlarged  $\times 4$ , of preceding.  
 Plattin (Macy) or Barnhart formation (upper 10 feet), Yaeger Farm, 3 miles northwest of Frankford, 5 $\frac{1}{2}$  miles southeast of New London, Ralls County, Mo.
- E. *Trematis parva* Cooper, new species..... 273  
 (13) Exfoliated brachial valve,  $\times 3$ , paratype, 109705a.  
 Lower Whitesburg formation,  $\frac{1}{2}$  mile west of Bulls Gap, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.  
 (14, 12) Brachial valve preserving exterior,  $\times 3$  and  $\times 6$ , holotype, 109703.  
 Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Va.
- F. *Schizocrania filosa* (Hall)..... 275  
 (20) Cluster of small individuals on a *Rafinesquina* shell,  $\times 3$ , figured specimen, 109711; (21) brachial valve,  $\times 2$ , of a large individual on the same slab.  
 Plattin group (Macy formation) or Barnhart formation (upper 10 feet), mouth of Big Creek, Ralls County, Mo.
- G. *Schizotreta* sp. 1..... 282  
 (22) Exterior of partially exfoliated pedicle valve,  $\times 4$ , figured specimen, 109650.  
 Lincolnshire formation (Hogskin member—upper 30 feet), road to Washburn, 4 $\frac{1}{2}$  miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.

## PLATE 20

## ORBICULOIDEA, SCHIZOTRETA

- A. *Schizotreta microthyris* Cooper, new species..... 278  
 (1) Exfoliated brachial valve,  $\times 2$ , paratype, 97547a; (2) partially exfoliated



- Page
- pedicle valve,  $\times 1$ , paratype, 97547b; (3) enlargement,  $\times 2$ , of apex of preceding specimen.
- Oranda formation, along the railroad  $\frac{1}{2}$  mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.
- B. *Orbiculoidea linvillensis* Cooper, new species..... 276  
 (4) Exfoliated brachial valve showing strong anterior pallial trunks,  $\times 2$ , paratype, 109637b; (5) exfoliated pedicle valve,  $\times 2$ , holotype, 109637a.  
 Oranda formation, 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.
- C. *Schizotreta subconica* Cooper, new species..... 281  
 (6) Pedicle exterior,  $\times 2$ , paratype, 109646d; (7) another pedicle valve, more exfoliated than the holotype,  $\times 2$ , paratype, 109646b; (8) replica of the pedicle exterior prepared from an impression,  $\times 2$ , paratype, 109646g; (9, 10) brachial valves,  $\times 2$ , paratypes, 109646e, f.  
 Pratt Ferry formation, 0.2 mile south of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- D. *Orbiculoidea eximia* Cooper, new species..... 275  
 (11, 12, 15) Brachial, pedicle, and side views,  $\times 1$ , of a complete specimen, holotype, 109632f; (13) apical view of an imperfect pedicle valve showing details of the foramen,  $\times 4$ , paratype, 109632d; (14) brachial exterior,  $\times 1$ , paratype, 109428b; (23) view of brachial valve showing apex,  $\times 4$ , paratype, 117953a; (16) imperfect pedicle valve,  $\times 1$ , paratype, 109632b; (17) brachial valve,  $\times 1$ , paratype, 109634b; (18) enlargement,  $\times 2$ , of preceding; (19, 22) brachial valve,  $\times 1$ ,  $\times 2$ , the enlargement showing faint groove extending from apex to posterior margin, paratype, 109428a; (20) apex of pedicle valve,  $\times 4$ , paratype, 109632e; (21) another pedicle valve, partially exfoliated showing long plate in pedicle slit,  $\times 4$ , paratype, 109632a.  
 Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

## PLATE 21

## SCHIZAMBON, SCHIZOTRETA

- A. *Schizambon* sp. 1..... 270  
 (1, 2) Exterior and interior of a young specimen showing spines and foramen,  $\times 4$ , figured specimen, 123306.  
 Effna—Rich Valley formations, Porterfield Quarry, 5 miles northeast of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- B. *Schizambon* sp. 2..... 270  
 (3) Posterior of a small specimen showing foramen,  $\times 8$ , figured specimen, 116829a; (4) exterior of a brachial valve,  $\times 4$ , figured specimen, 116829b; (5) interior of a brachial valve,  $\times 4$ , figured specimen, 116829c; (6) exterior of an imperfect valve showing the long spines,  $\times 4$ , figured specimen, 116829d.  
 Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- C. *Schizotreta corrugata* Cooper, new species..... 277  
 (7) Imperfect pedicle valve showing foramen,  $\times 4$ , paratype, 116808a; (8) fragmentary pedicle valve showing foramen,  $\times 2$ , paratype, 116808c; (9, 10) exterior and interior of an incomplete young pedicle valve,  $\times 4$ , specimen lost; (11, 12) exterior and interior views of an imperfect brachial valve,  $\times 5$ , paratype, 116808d; (13) exterior of another brachial valve showing apex,  $\times 4$ , paratype, 116808e; (14) exterior of a nearly perfect brachial valve,  $\times 2$ , paratype,

117972b; (15) immature brachial valve,  $\times 4$ , paratype, 116808g; (16) exterior of a brachial valve showing fine concentric lines of young stages and coarse elevated ridges of older parts of shell,  $\times 3$ , paratype, 116808h; (17) another young brachial valve,  $\times 4$ , paratype, 116808i; (18) exterior of a pedicle valve,  $\times 2$ , paratype, 117972a (for interior see pl. 28, G, figs. 27, 28); (19) young, elongate brachial valve,  $\times 3$ , paratype, 116808j; (20) exterior of a nearly complete brachial valve showing concentric corrugations,  $\times 6$ , paratype, 116808k.

Horizon and locality same as preceding.

- D. *Schizotreta shuleri* (Willard)..... 280  
 (21, 22) Exterior of two brachial valves showing strong concentric corrugations,  $\times 2$ , hypotypes, 117969a and 117969b.

Botetourt formation, on the south side of the road, 0.2 mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.

- E. *Schizotreta subconica* Cooper, new species..... 281  
 (23, 24) Exterior and interior of the pedicle valve showing the foramen,  $\times 3$ , holotype, 116805a; (25) a small pedicle valve,  $\times 4$ , paratype, 116805b; (26) small imperfect brachial valve,  $\times 4$ , paratype, 116805c; (27, 28) exterior and interior of a nearly perfect pedicle valve showing position of the pedicle foramen,  $\times 4$ , paratype, 116805d; (29-31) respectively exterior, interior, and side views of the pedicle valve showing foramen,  $\times 3$ , paratype, 116805e; (32) interior of the same specimen,  $\times 4$ , showing the foramen in more detail.

Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.

- F. *Schizotreta willardi* Cooper, new species..... 281  
 (33-35) Posterior, apical, and interior views of a fragment of the pedicle valve showing the foramen, posterior slope, and pedicle tube,  $\times 3$ , paratype, 116806a; (36) exterior of the brachial valve,  $\times 2$ , paratype, 116806b; (37) another fragmentary brachial valve showing the apex and posterior margin,  $\times 3$ , paratype, 116806c; (38) a fragmentary brachial valve showing small, low apex,  $\times 2$ , paratype, 116806e; (39) fragmentary pedicle valve showing pedicle slit,  $\times 2$ , specimen lost; (40, 41) exterior and interior of a nearly complete but young pedicle valve,  $\times 3$ , paratype, 116806f.

Horizon and locality same as preceding.

PLATE 22

ACROTRETA, CRANIOPS, OBOLELLINA, OBOLUS, PETROCRANIA, PHILHEDRA,  
 SCHIZAMBON, SCHIZOTRETA

- A. *Craniops attenuata* Cooper, new species..... 240  
 (1) Two valves,  $\times 3$ , holotype, 116798.  
 Carters formation (near top of massive limestone), quarry 0.3 mile north of Gate City, Leeds (15') Quadrangle, Ala.
- B. *Craniops trentonensis* (Hall)..... 241  
 (2) Lamellose brachial valve,  $\times 4$ , figured specimen, 109788b.  
 Nealmont formation (upper 50 to 75 feet), Reedsville, Pa.
- C. *Craniops tenuis* Cooper, new species..... 240  
 (3-5) Pedicle, side, and brachial views,  $\times 8$ , of the holotype, 109752a.  
 Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.
- D. *Schizotreta microthyris* Cooper, new species..... 278  
 (6, 8) Side and exterior views of a pedicle valve,  $\times 1$ , paratype, 116803a; (9, 7) same views, same specimen,  $\times 2$ , showing ornamentation.

	Page
Oranda formation, on Virginia Highway 55, 0.4 mile west of junction with U. S. Highway 11, north edge of Strasburg, Strasburg (15') Quadrangle, Va.	
E. <i>Acrotreta gemma</i> Billings.....	246
(10, 11) Posterior and anterior views of a pedicle valve, $\times 6$ , figured specimen, 116816a. Table Head series (upper), Table Point Cove, Newfoundland.	
F. <i>Obolus</i> sp. 2.....	192
(12, 13) Interior and the impression of same valve, $\times 3$ , showing muscle and palial marks, figured specimens, 116790a and 116790b. Blackford formation (shale below "Mosheim" but above Knox dolomite), about $\frac{3}{4}$ mile east of Rocky Point, Natural Bridge Special (15') Quadrangle, Va.	
G. <i>Petrocrania</i> sp. 1.....	290
(14) Interior of brachial valve showing muscle scars, $\times 2$ , figured specimen, 109776a. Ridley formation, U. S. Highway 27, just northwest of Chickamauga Creek, Kensington (T.V.A. 106-SE) Quadrangle, Ga.	
H. <i>Philhedra</i> ? sp. 1.....	292
(15) Impression of the brachial interior, $\times 2$ , figured specimen, 109761. Bromide formation (Mountain Lake member), near the northeast corner NW $\frac{1}{4}$ sec. 27, T. 1 S., R. 2 E., 3 miles northwest of Dougherty, Murray County, Okla.	
I. <i>Schizotreta microthyris</i> Cooper, new species.....	278
(16) Well-preserved but imperfect pedicle valve, $\times 2$ , holotype, 109640. Oranda formation (5 feet below top), on U. S. Highway 11, 1 mile southwest of Strasburg, Strasburg (15') Quadrangle, Va.	
J. <i>Schizambon</i> sp. 2.....	270
(17) Young pedicle valve, $\times 6$ , figured specimen, 109687. Pratt Ferry formation, 0.2 mile south of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
K. <i>Obolellina dixonensis</i> Cooper, new species.....	230
(18, 19) Interior impression of brachial valve, $\times 2$ and $\times 1$ , paratype, 71814b; (20, 21) impression of another brachial interior, $\times 2$ , $\times 1$ , holotype, 71814a. Platteville formation (just above sponge bed), Truman's Quarry, 2 miles northwest of Dixon, Dixon (15') Quadrangle, Ill.	
L. <i>Schizambon microthyris</i> Cooper, new species.....	278
(22) Pedicle exterior showing large foramen, $\times 1$ , paratype, 116928a; (23) exterior of brachial valve, $\times 1$ , paratype, 116928b; (24) imperfect brachial valve showing spines, $\times 3$ , paratype, 116928c. Wardell formation, south of road, $\frac{1}{2}$ mile east-northeast of Belfast Mill, Saltville (T.V.A. 212-NE) Quadrangle, Va.	

## PLATE 23

## ELLIPTOGLOSSA, LINGULOPS

A. <i>Lingulops norwoodi</i> (James).....	236
(1) Brachial exterior, $\times 6$ , figured specimen, 45219a. Trenton, West Covington, Ky.	
(2) Impression of brachial interior, $\times 6$ , figured specimen, 15863a; (3) replica, $\times 6$ , of the brachial interior prepared from preceding. Trenton, Ludlow, Ky.	

- |   | Page |
|---|------|
| B. <i>Lingulops norwoodi</i> (James).....   | 236  |
| (4) Impression of the brachial interior, $\times 6$ , figured specimen, 45219b.<br>Trenton, West Covington, Ky.   |      |
| C. <i>Lingulops cliftonensis</i> Foerste.....   | 235  |
| (5, 6) Respectively the replica of the brachial interior and the impression from which it was prepared, $\times 3$ , holotype, 78667.<br>Fernvale formation, Clifton, Tenn.   |      |
| D. <i>Elliptoglossa sylvanica</i> Cooper, new species.....  | 244  |
| (7) Pedicle interior, $\times 6$ , paratype, 109388a; (8) impression of brachial interior, $\times 6$ , paratype, 109388b; (9) another brachial impression showing the muscle marks more strongly, $\times 6$ , paratype, 109388i; (10) small pedicle interior, $\times 6$ , paratype, 109388f; (11) impression of pedicle interior, $\times 6$ , paratype, 109388g; (12) interior of the pedicle valve, $\times 10$ , paratype, 109388h; (13) exterior of the brachial valve, $\times 8$ , holotype, 109388e.<br>Sylvan shale (lower 40 feet), middle of east side sec. 34, T. 1 S., R. 2 E., Murray County, Okla. |      |
| E. <i>Elliptoglossa ovalis</i> (Bassler).....   | 242  |
| (14) Pedicle exterior, $\times 10$ , hypotype, 109371a; (21) partially exfoliated pedicle valve, $\times 6$ , hypotype, 109371b.<br>Edinburg formation (base of Liberty Hall facies), 1 mile northwest of Lexington, Lexington (15') Quadrangle, Va.  |      |
| (15) Brachial exterior, $\times 4$ , hypotype, 109379a.<br>Botetourt formation, 2 miles south of Albany and 8 miles northwest of Greenville, Mosheim (T.V.A. 181-NW) Quadrangle, Tenn.  |      |
| (16) Pedicle exterior, $\times 8$ , hypotype, 109370a.<br>Chatham Hill formation, Hoge Farm, 6 miles southwest of Bland, Bland County, Va.  |      |
| (17) Brachial exterior, $\times 10$ , hypotype, 109357e; (18) pedicle interior, $\times 8$ , hypotype, 109357c; (19) pedicle interior, $\times 8$ , hypotype, 109357d; (23) brachial interior, $\times 10$ , hypotype, 109357f; (25) brachial interior, $\times 10$ , hypotype, 109357b.<br>Oranda formation, 4 miles northwest of Linville Station, Broadway (15') Quadrangle, Va.   |      |
| (20) Poorly preserved interior, $\times 6$ , paratype, 66171c; (24) well-preserved brachial interior, $\times 6$ , lectotype, 66171a.<br>Martinsburg formation ( <i>Simmites</i> bed), 2 miles northwest of Kauffman, Chambersburg (15') Quadrangle, Pa.  |      |
| (22) Impression of the brachial interior, $\times 6$ , hypotype, 109378a.<br>Edinburg formation (Liberty Hall facies), 2 miles southwest of Broadway, Broadway (15') Quadrangle, Va.  |      |
| (26) Brachial interior, $\times 10$ , hypotype, 109380.<br>Oranda formation (15 to 20 feet beneath first graptolite zone of the Martinsburg shale), 1 mile south of St. Thomas, Mercersburg (15') Quadrangle, Pa.   |      |

## PLATE 24

## ELLIPTOGLOSSA, OBOLELLINA, PATERULA, PSEUDOBOLUS

- |  |     |
|--|-----|
| A. <i>Paterula polita</i> Cooper, new species.....   | 239 |
| (1, 2) Brachial and pedicle valves, $\times 10$ , paratype and holotype, 109411a and 109411b.<br>Lower Viola formation, SE $\frac{1}{4}$ sec. 32, T. 2 S., R. 2 E., 3 miles north-northeast of Springer, in Murray County, Okla. |     |
| B. <i>Elliptoglossa rotundata</i> Cooper, new species.....   | 244 |
| (3) Exterior of pedicle valve, $\times 3$ , holotype, 71885a; (4, 6) two brachial valves, $\times 3$ , paratypes, 71885c, d.   |     |

- Edinburg formation (Liberty Hall facies), Reservoir Hill, Wytheville, Va.  
 (5) Impression of brachial interior,  $\times 3$ , paratype, 109386a.  
 Edinburg formation (Liberty Hall facies—50 feet above Lincolnshire), Middle River,  $\frac{1}{2}$  mile north of Verona, Staunton (15') Quadrangle, Va.
- C. *Paterula subcircularis* Cooper, new species..... 239  
 (7) Brachial valve,  $\times 8$ , paratype, 109414a; (8) another brachial valve, of exfoliated interior,  $\times 4$ , paratype, 109414c; (9) pedicle valve, impression of interior,  $\times 3$ , holotype, 109414b; (10) plasticine replica of interior,  $\times 4$ , prepared from preceding.  
 Stringtown shale = Womble formation (Big Fork chert), near center sec. 29, T. 1 S., R. 12 E., about 2 miles southwest of Stringtown on south bank of North Boggy Creek, near base of exposure, Atoka County, Okla.
- D. *Paterula perfecta* Cooper, new species..... 238  
 (12, 22) Impressions of two brachial valves showing muscle marks,  $\times 12$ , paratypes, 109404e and 109404c; (13, 23) two pedicle interiors,  $\times 15$ , paratypes, 109404d and 109404g.  
 Oranda formation, 4 miles northwest of Linville Station, Broadway (15') Quadrangle, Va.  
 (11, 15, 17) Pedicle exteriors,  $\times 10$ ,  $\times 8$ ,  $\times 8$ , paratypes, 109409q, 109409p, 109409-o; (16) brachial exterior,  $\times 6$ , paratype, 109409h; (19, 21) pedicle interiors with excellently preserved muscle areas,  $\times 15$ , holotype, 109409k, and paratype, 109409i; (14) interior of pedicle valve showing pedicle notch,  $\times 10$ , paratype, 109409c.  
 Pratt Ferry formation, 0.2 mile south of Pratt Ferry, Blocton (15') Quadrangle, Ala.  
 (20) Brachial interior of an old specimen,  $\times 10$ , paratype, 109408a.  
 Botetourt formation, 1 mile northeast of Harrisonburg, Harrisonburg (15') Quadrangle, Va.  
 (18) Pedicle interior impression,  $\times 10$ , paratype, 109407.  
 Edinburg formation (Liberty Hall facies), opposite bridge at Riverton, Front Royal (15') Quadrangle, Va.
- E. *Obolellina canadensis* (Billings)..... 230  
 (24) Brachial view of the exterior,  $\times 1$ , holotype, G.S.C. 1150.  
 Leray-Rockland beds, Fourth Chute of the Bonnechère River, Renfrew County, Ontario, Canada.
- F. *Obolellina magnifica* (Billings)..... 231  
 (25) Brachial interior,  $\times 1$ , paratype, G.S.C. 1161b.  
 Rockland formation, Paquette Rapids, Ontario.
- G. *Pseudobolus gibbosus* (Willard)..... 194  
 (27-29) Pedicle, brachial, and side views of young but complete specimen,  $\times 1$ , hypotype, 109422a; (26) the same enlarged  $\times 2$ ; (30, 31) brachial and side views of a fully grown brachial valve,  $\times 1$ , hypotype, 109422b.  
 Murat formation, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.

## PLATE 25

## ACANTHOCRANIA, PETROCRANIA

- A. *Acanthocrania setigera* (Hall)..... 285  
 (1, 5) Brachial exterior,  $\times 2$  and  $\times 1$ , of a large specimen attached to a brachial valve of *Strophomena*, figured specimen, 24739; (2) enlargement,  $\times 4$ , of anterior of preceding; (3, 4) brachial interior,  $\times 1$  and  $\times 2$ , showing muscle scars, figured specimen, 24743a.  
 Decorah formation, Minneapolis, Minn.

	Page
B. <i>Petrocrania</i> ? <i>magna</i> Cooper, new species.....	289
(6, 7) Brachial valve, side and exterior, $\times 1$ , holotype, 109762. Effna formation, lower part of McNutt Quarry, 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.	
C. <i>Petrocrania</i> ? sp. 2.....	290
(8-10) Respectively interior, side, and exterior views of a silicified brachial valve, $\times 2$ , figured specimen, 109770. Edinburg formation (base of Liberty Hall facies), 1.8 miles S. 4° W. of Bethel Church, 5.9 miles due east of Harrisonburg, Harrisonburg (15') Quadrangle, Va.	
D. <i>Petrocrania</i> <i>halli</i> (Sardeson).....	288
(11) Brachial interior showing muscle scars, $\times 2$ , figured specimen, 24218a. Decorah formation (Spechts Ferry member— <i>Stictoporella</i> bed), Lake Street Bridge, St. Paul-Minneapolis, Minn. (12) Another brachial valve, $\times 2$ , figured specimen, 45218a. Decorah formation (Ion member— <i>Phylloporina</i> bed), St. Paul, Minn.	
E. <i>Petrocrania</i> <i>hamiltoniae</i> (Hall).....	288
(13) Plasticine replica of the interior made from an impression of the brachial in- terior showing muscle scars and pallial marks, $\times 1\frac{1}{2}$ , figured specimen, 116834c; (14) plasticine replica of the pedicle interior showing pallial and muscle marks prepared from an interior impression, $\times 1\frac{1}{2}$ , figured specimen, 116834b. Devonian, Ludlowville formation (Stone Mill member), at elevation of 1,265 feet on the road 1 mile southwest of Randallsville, Morrisville (15') Quadrangle, N. Y.	
F. <i>Petrocrania</i> <i>prona</i> (Raymond).....	289
(15) Exterior of brachial valve, $\times 2$ , cotype, Carnegie Mus. 5441; (16) brachial valve exterior, $\times 1$ , figured hypotype, A.M.N.H. 25046/2; (18) brachial interior showing large central muscle scars, $\times 2$ , cotype, Carnegie Mus. 5443; (17, 19) brachial interior, $\times 2$ and $\times 1$ , cotype, Carnegie Mus. 5442. Chazy group (Crown Point), Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
G. <i>Petrocrania</i> sp. 3.....	291
(20) Brachial interior, $\times 2$ , figured specimen, 109766a; (21, 22) side and exterior views of the brachial valve, $\times 2$ , figured specimen, 109766b. Bromide formation (Mountain Lake member), deep well of Oklahoma Mid- continent Petroleum Corporation, on Jones Farm, sec. 22, T. 5 N., R. 3 E., Pottawatomie County, Okla.	
H. <i>Petrocrania</i> sp. 1.....	290
(23) Brachial interior, $\times 2$ , figured specimen, 109778. Dryden formation (30 feet above marble), road along Little Sycamore Creek, $\frac{1}{2}$ mile northeast of west edge of the Howard Quarter (T.V.A. 162-NW) Quad- rangle, Tenn.	
I. <i>Petrocrania</i> <i>inflata</i> Cooper, new species.....	288
(24, 25) Side and exterior views of a brachial valve, $\times 2$ , paratype, 109767. Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), Rock Cross- ing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.	
J. <i>Petrocrania</i> <i>inflata</i> Cooper, new species.....	288
(26, 33) Side and exterior views of a brachial valve attached to <i>Strophomena</i> <i>crinereusis</i> , $\times 2$ , paratype, 109783c; (27, 32, 35) respectively side, exterior, and posterior views of a robust brachial valve, $\times 2$ , holotype, 109785a; (31, 34) brachial and side views of the holotype, $\times 1$ ; (28-30) side, posterior, and exte-	

rior views of another specimen showing surface ornament of the host *Strophomena crinerensis* reflected on the exterior,  $\times 2$ , paratype, 109785e.

Horizon and locality same as preceding.

Page

## PLATE 26

## ACANTHOCRANIA, PETROCRANIA, PHILHEDRA

- |    |   |     |
|----|---|-----|
| A. | <i>Acanthocrania grandis</i> Cooper, new species.....   | 284 |
|    | (1) Brachial valve, $\times 1$ , holotype, 116838; (2, 3) exterior and side views, $\times 2$ , of the holotype, showing spiny ornamentation.<br>Base of Benbolt formation, west slope of hill $\frac{1}{2}$ mile east of Cedar Point School, Hilton (T.V.A. 197-NW) Quadrangle, Va.  |     |
| B. | <i>Philhedra depressa</i> Cooper, new species.....  | 291 |
|    | (4, 5) Side and exterior views of the brachial valve, $\times 2$ , holotype, 109749.<br>Prosser formation, 25 feet above base of Duck Creek Quarry, near Green Bay, Wis.  |     |
| C. | <i>Philhedra ferruginea</i> Cooper, new species.....  | 291 |
|    | (6) Apical view, $\times 2$ , of the brachial valve, holotype, 109750; (7, 8) side and apical views, $\times 2$ , of the holotype.<br>Red Knobs formation, 7 miles northeast of Charleston, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.   |     |
| D. | <i>Acanthocrania cumberlandensis</i> (Foerste).....   | 284 |
|    | (9, 10) Exterior and side views of the brachial valve, $\times 2$ , lectotype, 87157a; (11) brachial interior, $\times 2$ , paratype, 87157b.<br>Wells formation, $\frac{1}{4}$ mile southwest of Cumberland City, Stewart County, Tenn.  |     |
| E. | <i>Philhedra minor</i> Cooper, new species.....   | 292 |
|    | (12, 13) Apical and side views, $\times 2$ , of the holotype, 109760.<br>Pierce formation, Pierce Mill, Walterhill, $7\frac{1}{2}$ miles north of Murfreesboro, Tenn.   |     |
| F. | <i>Petrocrania inflata</i> Cooper, new species.....   | 288 |
|    | (14, 15) Side and apical views of the brachial valve, $\times 2$ , paratype, 109758.<br>Bromide formation (Pooleville member—183 feet below massive limestone), second dam on Spring Creek, north of Woodford, Murray County, Okla.   |     |
| G. | <i>Acanthocrania erecta</i> Cooper, new species.....  | 284 |
|    | (16, 17) Apical and side views, $\times 2$ , of the holotype, 109789.<br>Bromide formation (Mountain Lake member ?), NW $\frac{1}{4}$ sec. 27, T. 1 S., R. 2 E., half way between Dougherty and Davis, Murray County, Okla.   |     |
| H. | <i>Acanthocrania spinosa</i> Cooper, new species.....   | 285 |
|    | (18, 19) Interior and exterior of the brachial valve, $\times 4$ , holotype, 109795.<br>Edinburg formation (Liberty Hall facies), 1.8 miles S. 4° W. of Bethel Church, 5.9 miles due east of Harrisonburg, Harrisonburg (15') Quadrangle, Va.   |     |
| I. | <i>Acanthocrania subquadrata</i> Cooper, new species.....   | 286 |
|    | (20, 21) Cluster of specimens covering brachial interior of <i>Öpikina</i> , $\times 1$ and $\times 3$ , paratype, 109793; (22, 25) apical and side views, $\times 2$ , of the holotype, 109759b; (23) interior of an imperfect brachial valve, $\times 2$ , paratype, 109759d; (24) apical view, $\times 3$ , of a specimen showing ornamentation of its host <i>Doleroides</i> impressed on brachial surface, paratype, 109759c.<br>Bromide formation (Upper Mountain Lake member), road cut on east side of Oklahoma Highway 18, 1.8 miles south of Sulphur, sec. 11, T. 1 S., R. 3 E., Murray County, Okla. |     |

## PLATE 27

## ACANTHOCRANIA, PACHYGLOSSA, PETROCRANIA, SCHIZOTRETA, TREMATIS

- |   | Page |
|---|------|
| A. <i>Schizotreta microthyris</i> Cooper, new species.....  | 278  |
| (1, 2) Apical view of a somewhat exfoliated brachial valve, $\times 1$ and $\times 2$ , paratype, 116804a.<br>Oranda formation, north side of U. S. Highway 11, 2 miles southwest of Strasburg, Strasburg (15') Quadrangle, Va.   |      |
| (3) Imperfectly preserved pedicle interior showing position of foramen, $\times 2$ , paratype, 97547c.<br>Oranda formation, along the railroad $\frac{1}{4}$ to $\frac{1}{2}$ mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.  |      |
| B. <i>Acanthocrania subquadrata</i> Cooper, new species.....  | 286  |
| (4) Apical view, $\times 1$ , of a paratype, 116836; (5, 6) apical and side views, $\times 2$ , of the same paratype; (7) apical view, $\times 4$ , of same.<br>Bromide formation (Pooleville member— <i>Lonchodomas</i> zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.  |      |
| C. <i>Pachyglossa pachydermata</i> Cooper, new species.....   | 225  |
| (8) Brachial view of an exfoliated specimen, the reverse of specimen shown in fig. 17, pl. 5, F, $\times 1$ , holotype, 116767.<br>Botetourt formation, roadside at junction of Virginia Highways 311 and 114, $\frac{1}{2}$ mile southwest of Catawba, Salem (15') Quadrangle, Va.   |      |
| D. <i>Trematis</i> sp. 1.....   | 274  |
| (9) Brachial valve, $\times 6$ , figured specimen, 117970.<br>Whitesburg formation, 2 $\frac{1}{2}$ miles southeast of Whitesburg, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.  |      |
| E. <i>Petrocrania dixonensis</i> Cooper, new species.....   | 287  |
| (10, 11) Apical and side views of the brachial valve, $\times 1$ , holotype, 45215.<br>Platteville formation, Dixon, Dixon (15') Quadrangle, Ill.   |      |
| F. <i>Acanthocrania</i> sp. 1.....  | 286  |
| (12, 13) Apical and side views of the brachial valve, $\times 2$ , figured specimen, 116839; (14) same, $\times 1$ .<br>Lebanon formation ( <i>Doleroides</i> zone), on U. S. Highway 70N, opposite Fairview Service Station, $\frac{1}{2}$ mile west of Rome, Tenn.  |      |
| G. <i>Petrocrania trentonensis</i> (Hall).....  | 290  |
| (15) Pedicle valve of <i>Eoplectodonta alternata</i> with encrusting <i>Petrocrania</i> seen in posterior view, $\times 1$ , hypotype, 116835; (16, 17) apical and side views, $\times 2$ , of the same specimen.<br>Martinsburg formation ( <i>Salona</i> equivalent), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va. |      |
| H. <i>Acanthocrania oklahomensis</i> Cooper, new species.....   | 285  |
| (18) Four individuals encrusting a valve of <i>Öpikina</i> , $\times 1$ , holotype, 116837a and paratypes, 116837b-d; (19) same, $\times 2$ ; (20) apical view of one of the individuals, $\times 3$ , holotype, 116837a.<br>Bromide formation (Pooleville member—bed 2), sec. 22, T. 2 S., R. 3 E., west of Nebo, Murray County, Okla.   |      |

## PLATE 28

## ACROTRETA, CONOTRETA, LINGULELLA, PACHYGLOSSA, SCHIZOTRETA, TORYNELASMA

- |  |     |
|--|-----|
| A. <i>Conotreta triangulata</i> Cooper, new species.....   | 254 |
| (1-4) Respectively tilted, anterior, side, and brachial views of a complete specimen, $\times 2$ , holotype, 117973. |     |



- |  | Page |
|--|------|
| Effna formation, on the north side of Virginia Highway 114, 7 miles northeast of Lusters Gate, near Blacksburg, Va.  |      |
| B. <i>Schizotreta posteroconvexa</i> Cooper, new species.....  | 279  |
| (5, 6) Side and posterior views of the pedicle valve, $\times 3$ , holotype, 116801b.<br>Base of Athens formation (beds with <i>Christiania</i> ), 0.2 mile southeast of Britton Church, 2½ miles northeast of Calhoun, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.  |      |
| C. <i>Pachyglossa dorsiconvexa</i> Cooper, new species.....  | 225  |
| (7, 8) Exterior and interior of the pedicle valve, showing apical region, $\times 3$ , paratype, 117976.<br>Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.   |      |
| D. <i>Acrotreta magna</i> Cooper, new species.....   | 246  |
| (9, 10) Apical and side views of the pedicle valve, $\times 3$ , holotype, 109724a; (11) plasticine squeeze showing a replica of the exterior of the brachial valve, $\times 3$ , paratype, 109724b; (12) exterior, $\times 5$ , of the same paratype showing details of ornamentation.<br>From boulders in the Mystic conglomerate, Range 6, Lot 20, 2½ miles north of Mystic, Stanbridge Township, Quebec, Canada.   |      |
| E. <i>Torynelasma tornyiferum</i> Cooper, new species.....   | 258  |
| (13-15) Exterior, side, and interior views of a large brachial valve, $\times 10$ , showing high median septum and spoonlike plate, slightly broken at the anterior end, paratype, 116825f; (16) posterior view of a pedicle valve, $\times 10$ , paratype, 116825e.<br>Pratt Ferry formation (lower 3 feet), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.  |      |
| F. <i>Lingulella lirata</i> Cooper, new species.....   | 201  |
| (17, 18) Interior views of two pedicle valves, $\times 4$ , showing apical region, paratypes, 117975b and 117975c; (19) apex of specimen shown in fig. 18 enlarged $\times 8$ to show apical structures in more detail; (21, 22) exterior and interior of a nearly perfect brachial valve showing ornamentation and apical structures, respectively $\times 2$ and $\times 3$ , paratype, 117975a; (23) apical region, $\times 6$ , of the preceding; (20) exterior of a large brachial valve, $\times 3$ , paratype, 117980.<br>Horizon and locality same as preceding.                 |      |
| G. <i>Schizotreta corrugata</i> Cooper, new species.....   | 277  |
| (27) Interior of a pedicle valve (see pl. 21, C, fig. 18, for exterior view), showing foramen and traces of muscle scars, $\times 3$ , paratype, 117972a; (28) posterior part, $\times 6$ , of the preceding, showing foramen in greater detail; (24, 25) exterior and interior of a nearly complete brachial valve, $\times 2$ , holotype, 116808-1; (26) interior of a brachial valve showing flattened marginal rim and traces of the muscles, $\times 3$ , paratype, 117972b. (For the exterior of this specimen see pl. 21, C, fig. 14.)<br>Horizon and locality same as preceding. |      |

## PLATE 29

## ORTHIDIELLA, TREMATORTHIS

- |  |     |
|--|-----|
| A. <i>Trematorthis masoni</i> Ulrich and Cooper.....   | 341 |
| (1-5) Brachial, posterior, side, pedicle, and anterior views of a complete specimen, $\times 3$ , hypotype, 116863d; (6) brachial interior, $\times 4$ , showing brachiophores and supporting swellings, hypotype, 116863g; (7) pedicle interior showing pallial trunks, $\times 3$ , paratype, 95876a; (15) exterior, $\times 3$ , of same; (8) posterior view showing apical foramen, $\times 3$ , lectotype, 95876c; (11) exterior, $\times 3$ , of preceding; (14) posterior of pedicle valve, $\times 6$ , hypotype, 116863f; (9, 10) posterior |     |

	Page
and interior views of a brachial valve, $\times 3$ , showing brachiophores and their supports, paratype, 95876e; (12) posterior of another brachial valve showing cardinal process, $\times 4$ , hypotype, 116863a; (13) pedicle interior, $\times 4$ , hypotype, 116863e.	
Pogonip group (mottled zone 700 feet below the Eureka quartzite), base of the first ridge east of Frenchman Flat, Las Vegas (1°) Quadrangle, Nev.	
B. <i>Trematorthis tenuis</i> Cooper, new species.....	342
(16-20) Brachial, side, pedicle, anterior, and posterior views, $\times 3$ , of the holotype, 117978a.	
Horizon and locality same as preceding.	
C. <i>Trematorthis robusta</i> Cooper, new species.....	342
(21-25) Respectively anterior, brachial, posterior, side, and pedicle views, $\times 4$ , of the holotype, 116865a; (26) pedicle interior, $\times 4$ , paratype, 116865c; (27) same, $\times 4$ , tilted to show the pseudodeltidium.	
Horizon and locality same as preceding.	
PLATE 30	
ORTHIDIELLA, ORTHIDIUM	
A. <i>Orthidium bellulum</i> Ulrich and Cooper.....	340
(1-5) Respectively posterior, pedicle, side, brachial, and anterior views, $\times 4$ , of the holotype, 92848.	
Upper Pogonip group, Ikes Canyon, east side of Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.	
B. <i>Orthidiella</i> sp. 1.....	340
(6-9) Anterior, pedicle, side, and brachial views of an unusually fasciculate individual, $\times 2$ , figured specimen, 116861a; (10) posterior, $\times 3$ , of the preceding; (11) interior of the brachial valve of a similarly marked specimen, $\times 3$ , figured specimen, 116861b.	
Pogonip group (mottled zone 700 feet below the Eureka quartzite), base of first ridge east of Frenchman Flat, Las Vegas (1°) Quadrangle, Nev.	
C. <i>Orthidiella costellata</i> Cooper, new species.....	338
(12) Interior of the brachial valve, $\times 2$ , showing the cardinal process, paratype, 116859b; (13) exterior of a large pedicle valve showing the fine ornamentation, $\times 1$ , paratype, 116859d; (14) interior of the pedicle valve, $\times 2$ , showing elongate diductor muscle scars, paratype, 116859e; (15-17) pedicle, side, and brachial views of a complete specimen, $\times 2$ , holotype, 116859a; (19) complete specimen slightly turned to the side to show the cardinal process in position, $\times 4$ , paratype, 116859c.	
Pogonip group ( <i>Orthidiella</i> zone), in the narrows 2 miles up Whiterock Canyon, Roberts Mountains (1°) Quadrangle, Nev.	
(18) <i>Orthidiella</i> cf. <i>O. costellata</i> Cooper, new species. Brachial view of a large complete specimen, $\times 2$ , figured specimen, 117981a.	
Pogonip group (mottled zone 700 feet below the Eureka quartzite), base of first ridge east of Frenchman Flat, Las Vegas (1°) Quadrangle, Nev.	
D. <i>Orthidiella longwelli</i> Ulrich and Cooper.....	339
(20) Posterior of the brachial valve showing the cardinal process, $\times 4$ , holotype, 91299.	
Horizon and locality same as preceding.	
E. <i>Orthidiella extensa</i> Ulrich and Cooper.....	339
(21-24) Brachial, side, pedicle, and anterior views of a nearly perfect specimen, $\times 2$ , hypotype, 116857f; (26) same, $\times 1$ ; (27) posterior view of same, $\times 3$ ,	

showing cardinal process; (25, 28) brachial view,  $\times 1$  and  $\times 2$ , of another complete specimen, hypotype, 116857a; (29) posterior view of a large brachial valve showing cardinal process,  $\times 4$ , hypotype, 116857e; (30) brachial interior,  $\times 3$ , showing swellings around brachial plates, hypotype, 116857b; (31) large pedicle valve,  $\times 3$ , showing ovarian impressions and elongate muscle scar, hypotype, 116857g; (32) brachial interior,  $\times 3$ , hypotype, 116857c.

Horizon and locality same as preceding.

Page

## PLATE 31

## ARCHAEORTHIS, ORTHIDIUM, PLEURORTHIS

- A. *Orthidium fimbriatum* Cooper, new species..... 340  
 (1-3) Brachial, side, and pedicle views of a large specimen,  $\times 3$ , holotype, 116855a.  
 Table Head series,  $\frac{1}{2}$  mile north of Belle Burn, Newfoundland.  
 (4) Brachial exterior,  $\times 4$ , showing frill, paratype, 116854a.  
 Table Head series, south side of Stearing Island, Cow Head, Newfoundland.  
 (5, 6) Exterior and side views of a large pedicle valve,  $\times 3$ , paratype, 116856b.  
 Table Head series, Table Point Cove, Newfoundland.
- B. *Archaeorthis biconvexa* Cooper, new species..... 293  
 (7, 10) Interior and exterior of the brachial valve,  $\times 3$ , paratype, 116852b; (8, 9) interior and exterior of the pedicle valve,  $\times 3$ , holotype, 116852a.  
 Limestone lens in Womble formation, 1,100 feet south and 700 feet west of the NE corner sec. 3, T. 2 N., R. 19 E., Pushmataha County, Okla.
- C. *Pleurorthis costellata* Cooper, new species..... 330  
 (11, 12) Brachial valve,  $\times 1$  and  $\times 2$ , paratype, 116845c; (13, 14) pedicle valve exterior,  $\times 2$  and  $\times 1$ , holotype, 116845b.  
 Boulder in Mystic conglomerate, Range 6, Lot 20,  $2\frac{1}{2}$  miles north of Mystic, Stanbridge Township, Quebec, Canada.
- D. *Pleurorthis convexa* Cooper, new species..... 329  
 (15, 17) Pedicle exterior,  $\times 2$  and  $\times 1$ , holotype, 116844e; (16, 19) brachial exterior showing deep sulcus,  $\times 1$  and  $\times 2$ , paratype, 116844d; (18) exterior of a large brachial valve,  $\times 2$ , paratype, 116844b; (20) an imperfect pedicle exterior,  $\times 2$ , paratype, 116844a; (21) brachial exterior,  $\times 2$ , paratype, 116844c.  
 Horizon and locality same as preceding.
- E. *Pleurorthis fascicostellata* Cooper, new species..... 331  
 (22) Exterior of a small pedicle valve,  $\times 1$ , paratype, 116841b; (24) impression of the brachial interior prepared by burning and scraping away the shell,  $\times 2$ , paratype, 116841g; (25) large brachial valve,  $\times 1$ , paratype, 116841c; (26) pedicle impression showing dental plate slots,  $\times 2$ , paratype, 116841i; (27) large brachial exterior,  $\times 1$ , paratype, 116841d.  
 Horizon and locality same as preceding.  
 (23) Plasticine replica of the exterior of a large pedicle valve,  $\times 1$ , holotype, 117982.  
 Mystic conglomerate boulder, Range 6, Lot 21, 2.6 miles north and  $\frac{1}{2}$  mile east of Mystic, Stanbridge Township, Quebec, Canada.
- F. *Pleurorthis tritonia* (Billings)..... 332  
 (28, 29) Interior and exterior of an imperfect brachial valve,  $\times 2$ , holotype, G.S.C. 807.  
 Limestone No. 2, in Lévis shale, Lévis, Quebec, Canada.

## PLATE 32

## CYRTONOTELLA, HESPERORTHIS, PLEURORTHIS, RHYSOSTROPHIA

- |  | Page |
|--|------|
| A. <i>Pleurorthis</i> sp. 1.....   | 332  |
| (1) Brachial valve, $\times 2$ , figured specimen, 116846.<br>Table Head series, south side of Stearing Island, Cow Head, Newfoundland.  |      |
| B. <i>Pleurorthis imbecilis</i> (Billings).....  | 331  |
| (2, 4) Two pedicle valves, fig. 4 showing the dental plate impressions, $\times 2$ , hypotypes, 116842b and 116842a.<br>Upper Table Head series, Table Point Cove, Newfoundland.   |      |
| (3) Brachial exterior, $\times 2$ , hypotype, 116843.<br>Upper Table Head series, Table Point, Newfoundland.   |      |
| C. <i>Pleurorthis</i> sp. 2.....   | 333  |
| (5, 6) Exterior and interior of a silicified pedicle valve, $\times 2$ , figured specimen, 116848.<br>Lower middle Table Head series, north of Table Head, Newfoundland.   |      |
| D. <i>Rhysostrophia</i> sp. 1.....   | 560  |
| (7, 8) Interior and exterior of a pedicle valve, $\times 4$ , figured specimen, 17228.<br>Pogonip group ( <i>Desmorthis</i> zone), west side of Goodwin Canyon, Eureka District, Nev.  |      |
| E. <i>Hesperorthis</i> ? <i>costalis</i> (Hall).....   | 349  |
| (9, 13) Impression of pedicle interiors showing short dental plates and muscle scars, $\times 2$ , hypotypes, 116853d, 116853e; (10, 11) respectively impression of the brachial interior and a replica of the interior prepared from the impression, $\times 2$ , hypotype, 116853j; (12) somewhat exfoliated pedicle exterior, $\times 2$ , hypotype, 116853b; (14) another pedicle valve, $\times 2$ , hypotype, 116853c.<br>Day Point formation (upper " <i>Orthis</i> " bed), quarry just north of Hotel Champlain, south of Cliff Haven, Plattsburg (15') Quadrangle, N. Y.  |      |
| (15) An imperfect pedicle valve, $\times 2$ , Hall's type specimen, A.M.N.H. 528.<br>Chazy group, Chazy, N. Y.   |      |
| F. <i>Cyrtonotella</i> ? sp. 1.....  | 326  |
| (16, 17) Respectively the plasticine replica of the brachial valve, $\times 2$ , and the impression from which it was prepared, $\times 2$ , figured specimen, 109867b; (18) plasticine replica of the brachial exterior, $\times 2$ , figured specimen, 109867a; (19) plasticine replica prepared from the internal impression of a somewhat larger brachial valve than that figured above, $\times 2$ , figured specimen, 109867d; (20) brachial exterior, $\times 2$ , counterpart to internal impression shown in fig. 17, figured specimen, 109867c; (21) plasticine replica of the pedicle exterior, $\times 2$ , figured specimen, 109867a. This specimen is the counterpart of the brachial exterior shown in fig. 18.<br>Botetourt formation, Hayes Creek, 2 miles northwest of Brownsburg, Lexington (15') Quadrangle, Va. |      |

## PLATE 33

## ORTHAMBONITES

- |  |     |
|--|-----|
| A. <i>Orthambonites divaricatus</i> Cooper, new species.....   | 302 |
| (1, 2) Interior and exterior of the pedicle valve, $\times 1$ , holotype, 109838a; (3) brachial interior, $\times 2$ , paratype, 109838b.<br>Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va. |     |
| B. <i>Orthambonites multicostellatus</i> Cooper, new species.....  | 307 |
| (4, 5) Interior and exterior of the brachial valve, $\times 1$ , paratype, 116875a.  |     |

- |  | Page |
|--|------|
| Oranda formation along the railroad $\frac{1}{2}$ mile west of Strasburg, Strasburg (15') Quadrangle, Va.  |      |
| (6, 7) Pedicle exterior, $\times 2$ and $\times 1$ , holotype, 116876a.  |      |
| Edinburg limestone ( <i>Cyrtonotella</i> zone), along the railroad about $\frac{1}{8}$ mile east of Strasburg Junction, Va.  |      |
| C. <i>Orthambonites acutiplicatus</i> (Raymond).....   | 294  |
| (8) Somewhat exfoliated brachial exterior, $\times 2$ , paratype, Carnegie Mus. 5460;  |      |
| (9) small pedicle valve, $\times 1$ , lectotype, Carnegie Mus. 5458; (10, 11) respectively $\times 2$ and $\times 1$ enlargements of a large pedicle valve, paratype, Carnegie Mus. 5459.  |      |
| Chazy group (Day Point ? formation), Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.  |      |
| D. <i>Orthambonites paucicostatus</i> (Ulrich and Cooper).....   | 310  |
| (12, 14) Respectively $\times 2$ and $\times 1$ enlargements of a pedicle valve, hypotype, 109834m; (13, 15, 16) side, pedicle, and brachial views of an imperfect specimen, $\times 2$ , hypotype, 109834a; (19) pedicle view, $\times 1$ , of the preceding; (17, 18) brachial valve, $\times 2$ and $\times 1$ , hypotype, 109834b. |      |
| Upper Pogonip group (lower part of <i>Rhysostrophia</i> bed), Ikes Canyon, east side Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.  |      |
| E. <i>Orthambonites dinorthoides</i> Cooper, new species.....  | 301  |
| (20) Brachial interior, $\times 2$ , paratype, 109822a; (22) imperfect pedicle valve, $\times 1$ , paratype, 109822b.  |      |
| Upper Oil Creek formation, West Spring Creek, 3 miles east of Pooleville, Murray County, Okla.   |      |
| (21) Exterior of a small brachial valve, $\times 1$ , paratype, 109823d; (24) nearly perfect pedicle valve, $\times 1$ , holotype, 109823b; (25) nearly perfect brachial interior, $\times 2$ , paratype, 109823a; (26) pedicle interior, $\times 2$ , paratype, 109823c.  |      |
| Oil Creek formation (614 feet above base), west side U. S. Highway 77, NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 25, T. 2 S., R. 1 E., Carter County, Okla.   |      |
| (23) Large brachial valve, $\times 1$ , paratype, 109821a; (27) impression of the pedicle interior showing the muscle scars, $\times 2$ , paratype, 109821d.   |      |
| Oil Creek formation, sec. 14, T. 2 S., R. 1 E., about 5 miles north-northwest of Springer, in Murray County, Okla.   |      |

## PLATE 34

## ORTHAMBONITES

- |   |     |
|---|-----|
| A. <i>Orthambonites bifurcatus</i> Cooper, new species.....   | 297 |
| (1) Exterior of a silicified pedicle valve showing the ornamentation well, $\times 2$ , paratype, 116869; (2-4) side, brachial, and pedicle views, $\times 2$ , of a nearly complete specimen, the holotype, 109798e; (6) holotype, $\times 1$ ; (5) brachial view of another small individual, $\times 1$ , paratype, 109798g. |     |
| Upper Pogonip group ( <i>Rhysostrophia</i> zone), north side of Ikes Canyon 1 mile above the entrance, east side of Toquima Range, Roberts Mountains, (1°) Quadrangle, Nev.   |     |
| B. <i>Orthambonites occidentalis</i> Cooper, new species.....   | 308 |
| (7-9) Pedicle, side, and brachial views, $\times 1$ , of the holotype, 109807a.   |     |
| Horizon and locality same as preceding.   |     |
| C. <i>Orthambonites rectangulatus</i> Cooper, new species.....  | 310 |
| (10) Pedicle view, $\times 1$ , of the holotype, 116877; (11-15) respectively posterior, anterior, pedicle, side, and brachial views, $\times 2$ , of the holotype.   |     |
| Shippensburg formation (Pinesburg member—just above <i>Echinospaerites</i>  |     |

- zone), west bank of Conococheague Creek, on U. S. Highway 40, at Wilson, 7 miles west of Hagerstown, Williamsport (15') Quadrangle, Md.
- D. *Orthambonites minus* Cooper, new species..... 304  
 (16-20) Posterior, pedicle, side, brachial, and anterior views,  $\times 3$ , of the holotype, 116882.  
 Tulip Creek formation, about 90 feet below top, east edge of NE $\frac{1}{4}$  sec. 25, T. 2 S., R. 1 E., east side of U. S. Highway 77, 2 $\frac{1}{2}$  miles north of Springer, Carter County, Okla.
- E. *Orthambonites subconvexus* Cooper, new species..... 312  
 (21, 22) Respectively  $\times 1$  and  $\times 2$  enlargements of the brachial interior, paratype, 109844b; (26) exterior,  $\times 1$ , of preceding; (23, 24) exterior and interior of the pedicle valve,  $\times 1$ , holotype, 109844a; (25) holotype,  $\times 2$ .  
 Oil Creek formation (75 to 100 feet below the top), SW $\frac{1}{4}$  sec. 31, T. 1 S., R. 1 W., on West Spring Creek, east of Pooleville, Murray County, Okla.
- F. *Orthambonites rotundiformis* Cooper, new species..... 311  
 (27) Impression of the pedicle interior showing scars of ponderous dental plates, teeth, and pallial marks,  $\times 2$ , paratype, 109842a; (35) plasticine replica of the brachial exterior,  $\times 2$ , paratype, 109842b.  
 Basal Athens formation, on Cleveland-Benton road, 5 to 5 $\frac{1}{2}$  miles east of Cleveland, East Cleveland (T.V.A. 120-NE) Quadrangle, Tenn.  
 (28-30) Side, pedicle, and brachial views of a complete specimen,  $\times 2$ , holotype, 109843a; (33) brachial interior,  $\times 2$ , paratype, 109843b; (34) pedicle interior,  $\times 2$ , paratype, 109843c.  
 Basal Athens (*Christiania* beds), 600 feet S. 40° E. of the highway and railroad crossing 1 mile northeast of Athens, above quarry, Athens (T.V.A. 125-NE) Quadrangle, Tenn.  
 (31) Impression of the brachial valve,  $\times 3$ , paratype, 109840i; (32) impression of the pedicle interior,  $\times 2$ , paratype, 109840h; (36, 37) interior of old brachial valve showing pallial and muscle marks, and the plasticine replica prepared from the impression,  $\times 2$ , paratype, 109840j; (38) pedicle interior impression showing ovarian impressions and muscle scars,  $\times 2$ , paratype, 109840f; (39) plasticine replica of the pedicle exterior from a mold,  $\times 2$ , paratype, 109840g.  
 Basal Athens formation, roadside just east of intersection, 2 $\frac{1}{2}$  miles south-southeast of Riceville, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.

## PLATE 35

## ORTHAMBONITES

- A. *Orthambonites mostellerensis* Cooper, new species..... 306  
 (1-4) Brachial, side, posterior, and pedicle views of a complete specimen,  $\times 1$ , holotype, 109810b; (8) brachial interior,  $\times 2$ , of the holotype; (6) pedicle interior,  $\times 1$ , of holotype; (7) pedicle interior,  $\times 2$ , paratype, 109810e; (9) another pedicle interior showing large teeth and crural fossettes,  $\times 2$ , paratype, 109810a; (5) exterior,  $\times 1$ , of preceding; (10) brachial interior showing thick cardinal process and brachiophores,  $\times 2$ , paratype, 109810c.  
 Little Oak formation, cut on L. and N. RR.,  $\frac{3}{4}$  mile northwest of Mosteller, Columbiana (15') Quadrangle, Ala.
- B. *Orthambonites parvicrassicostatus* Cooper, new species..... 309  
 (11-15) Anterior, side, pedicle, brachial, and posterior views of a perfect specimen,  $\times 2$ , holotype, 116872a; (16) brachial view of another complete specimen,  $\times 1$ , paratype, 116872b; (22) same,  $\times 2$ ; (17) brachial interior,  $\times 2$ , paratype, 116872c.

Benbolt formation, wash on east side slope in pasture, 0.2 mile south of the middle fork of Moccasin Creek, 1½ miles due south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.

(18-21) Pedicle, brachial, posterior, and side views of a complete specimen, × 2, paratype, 116871b.

Benbolt (lower), west slope of hill ½ mile east of Cedar Point School, Hilton (T.V.A. 197-NW) Quadrangle, Va.

(23) Brachial interior, × 3, paratype, 109832a; (24, 25) brachial and pedicle valves of a complete specimen, × 3, paratype, 109832b.

Effna formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.

C. *Orthambonites blountensis* Cooper, new species..... 298

(26-28) Brachial, pedicle, and side views, × 1, of the holotype, 109812h; (29) brachial view, × 2, of holotype; (30, 31) exterior and interior of pedicle valve, × 2, paratype, 109812a; (32) exterior of another pedicle valve, × 2, paratype, 109812b; (33, 34) interior and exterior of brachial valve, × 2, paratype, 109812c.

Arline formation, north side of wagon road in glade, ¼ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

D. *Orthambonites bellus* Cooper, new species..... 295

(35, 36) Pedicle interior, respectively titled to show dental plates and normally posed, × 2, holotype, 116866c; (38) pedicle exterior, × 1, paratype, 116866a; (43, 44) brachial exterior, respectively × 2 and × 1, paratype, 116866f; (45) interior, × 2, of same; (46, 47) brachial interior, × 1 and × 2, paratype, 116866e.

Chatham Hill formation, north slope Walker Mountain, 1.2 miles S. 31° E. of Sharon Springs, Burkes Garden (15') Quadrangle, Va.

(37, 39) Interior and exterior of a pedicle valve, × 2, paratype, 109799a; (40) brachial interior, × 2, paratype, 109799b; (41, 42) exterior and interior of a brachial valve, × 2, paratype, 109799c; (48, 51) interior and exterior of a small pedicle valve, × 3, paratype, 109799d; (49, 50) interior and exterior of a small brachial valve, × 3, paratype, 109799e.

Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Va.

### PLATE 36

#### ORTHAMBONITES

A. *Orthambonites friendsvillensis* Cooper, new species..... 303

(1) Brachial interior, × 2, paratype, 109827g; (2, 4, 5, 7) pedicle, posterior, brachial, and side views of a complete specimen, × 1, holotype, 109827b; (6) brachial view, × 2, of the holotype; (3) brachial views of another complete specimen, × 2, paratype, 109827c; (8) pedicle interior, × 2, paratype, 109827h.

Arline formation, north side of wagon road in glade, ¼ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

B. *Orthambonites bielsteini* Cooper, new species..... 296

(9, 12, 13, 15, 17) Brachial, side, posterior, anterior, and pedicle views of a complete specimen, × 1, paratype, 109803b; (10, 11, 14) brachial, pedicle, and side views, × 1, of another complete specimen, holotype, 109803a.

Martinsburg formation (Salona equivalent), 14 miles north of Staunton, Va.

(16) Brachial interior somewhat doubtfully referred to this species, × 2, figured specimen, 109845a.

Benbolt formation, ¼ mile east of Speers Ferry, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

(18) Brachial view of the exterior, × 1, figured specimen, 109801.

- Shippensburg formation (Pinesburg member—shaly beds between *Echino-sphaerites* and lower *Nidulites* zones), railroad cut 1.7 miles southwest of Marion, Chambersburg (15') Quadrangle, Pa.
- C. *Orthambonites angulatus* Cooper, new species..... 294  
(19, 20) Exterior and interior of a large pedicle valve,  $\times 1$ , holotype, 109797.  
Probably Arline formation, James Wayland Farm near Riverdale, 9 miles east of Knoxville, Shooks Gap (T.V.A. 147-NE) Quadrangle, Tenn.
- D. *Orthambonites buttsi* (Schuchert and Cooper)..... 300  
(21, 25, 28, 29) Pedicle, posterior, brachial, and side views of a large specimen,  $\times 1$ , hypotype, 109808a; (27) brachial view,  $\times 2$ , of preceding specimen; (22, 31) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial interior, hypotype, 116870b; (23, 26) pedicle interior, respectively  $\times 2$  and  $\times 1$ , hypotype, 116870c; (30) exterior,  $\times 1\frac{1}{2}$ , of same; (24) brachial view of a complete specimen,  $\times 1$ , hypotype, 116870a.  
Little Oak formation, intersection Bailey Gap road with main road, SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 13, T. 19 S., R. 2 W., 1 $\frac{3}{4}$  miles northeast of Newhope Church, Vandiver (15') Quadrangle, Ala.
- E. *Orthambonites brachiophorus* Cooper, new species..... 298  
(32, 33) Imperfect brachial valve, respectively tilted to side and seen in normal view to show long brachial processes,  $\times 2$ , paratype, 109835a; (34, 39) pedicle exterior,  $\times 1$  and  $\times 2$ , holotype, 109835c; (35) brachial exterior,  $\times 1$ , paratype, 109835d; (36) pedicle interior showing muscle area and pallial trunks,  $\times 1$ , paratype, 109835f; (37, 38) respectively  $\times 2$  and  $\times 1$  enlargement of a brachial valve, paratype, 109835b.  
Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.

## PLATE 37

## MIMELLA, ONNIELLA, ORTHAMBONITES

- A. *Mimella superba* Butts = *M. globosa* (Willard)..... 472  
(1-4) Respectively pedicle, anterior, brachial, and side views of the type specimen of *Mimella superba* Butts,  $\times 1$ , hypotype, of *M. melonica* (Willard), 98210.  
Probably Benbolt formation, Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- B. *Mimella virginensis* Cooper, new species..... 487  
(5-7) Respectively side, pedicle, and brachial views,  $\times 1$ , of the holotype, 98188a.  
Whistle Creek formation, along Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.
- C. *Onniella* ? *americana* Cooper, new species..... 953  
(8-12) Respectively brachial, side, posterior, anterior, and pedicle views, of the holotype,  $\times 1$ , 116964a; (13-14) respectively  $\times 1$  and  $\times 2$  views of the pedicle exterior of another specimen, paratype, 116964b.  
Lower Hermitage formation, along Tennessee Highway 53, 1 to 1 $\frac{1}{4}$  miles south-southeast of Woodbury, Woodbury (15') Quadrangle, Tenn.
- D. *Orthambonites neumani* Cooper, new species..... 307  
(15, 16) Plasticine replicas of the exterior of the pedicle valve,  $\times 1$ , paratypes, 116874b and 116874-o; (17, 18) plasticine replicas of two brachial exteriors,  $\times 1$ , paratypes, 116874d and 116874q; (19, 20) respectively the impression of the brachial interior and a plasticine replica of the interior prepared from it,  $\times 1$ , paratype, 116874d. This is the inner counterpart to the exterior shown in fig. 17; (21, 22) impression of the brachial interior and a plasticine replica prepared from it,  $\times 1$ , paratype, 116874-1; (23, 24) another impression of the interior of



a thickened brachial valve showing the enlarged cardinal process,  $\times 1$ , paratype, 116874n; (25) the posterior of the preceding enlarged,  $\times 2$ , to show the cardinal process in more detail; (26, 27) impression of the interior of the pedicle valve and a replica of the pedicle interior prepared from it to show the form of the muscle scars and the nature of the dental plates,  $\times 1$ , holotype, 116874e; (28) impression of the muscle scars of another pedicle valve,  $\times 2$ , paratype, 116874h.

Tellico formation (sandstone No. 3), 0.3 mile northwest of Cold Springs School, Wildwood (T.V.A. 147-SE) Quadrangle, Tenn.

## PLATE 38

## NOTHORTHIS, ORTHAMBONITES, TAPHRORTHIS

- A. *Taphrorthis emarginata* Cooper, new species..... 327  
 (1) Interior of an imperfect brachial valve showing the cardinalia,  $\times 2$ , paratype, 117983b; (2) interior of an imperfect pedicle valve showing muscle scars and median ridge,  $\times 2$ , paratype, 117983a.  
 Arline formation, 100 yards southwest of the Negro Cemetery,  $\frac{1}{2}$  mile north-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- B. *Nothorthis tarda* Cooper, new species..... 315  
 (3-5) Respectively exterior views of three pedicle valves,  $\times 4$ , paratypes, 116851a-c; (6) exterior of a complete specimen,  $\times 4$ , holotype, 116851d; (7, 13) exterior and interior of a brachial valve,  $\times 4$ , paratype, 116851e; (8, 12) exterior and interior of another brachial valve showing the muscle scars,  $\times 4$ , paratype, 116851f; (9-11) interior views of three pedicle valves showing small muscle area, pallial sinuses, and dental plates,  $\times 4$ , paratypes, 116851i, 116851a and 116851j; (14, 15) interior of two brachial valves showing deeply entrenched adductor scars,  $\times 4$ , paratypes, 116851g and 116851h.  
 Pratt Ferry formation (lower third), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- C. *Taphrorthis peculiaris* Cooper, new species..... 328  
 (16, 17) Exterior and interior of the brachial valve,  $\times 2$ , paratype, 117984a; (18, 19) interior and exterior of the pedicle valve,  $\times 2$ , paratype, 117984b; (20) exterior of another pedicle valve,  $\times 2$ , paratype, 117984e.  
 Horizon and locality same as preceding.
- D. *Nothorthis delicatula* Ulrich and Cooper..... 315  
 (21) Exterior of the pedicle valve,  $\times 3$ , paratype, G.S.C. 9067d; (22, 24) exterior and interior of a young pedicle valve,  $\times 3$ , paratype, G.S.C. 9067f; (23) exterior of a large pedicle valve,  $\times 3$ , lectotype, G.S.C. 9067e; (25, 26) exterior and interior of a large brachial valve,  $\times 3$ , paratype, G.S.C. 9067; (27, 28) exterior and interior of another brachial valve,  $\times 3$ , showing cardinalia, paratype, G.S.C. 9067a; (29) interior of the preceding,  $\times 4.5$ , showing cardinalia in greater detail.  
 Possibly an erratic in the lower part of the Lévis shale, Lévis, Quebec.
- E. *Orthambonites tenuicostatus* Cooper, new species..... 314  
 (30-34) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen,  $\times 3$ , holotype, 116875b; (35, 36) interior and exterior of a brachial valve showing form of muscle scars,  $\times 3$ , paratype, 116875e; (37) another pedicle interior,  $\times 3$ , paratype, 116875a; (38, 39) interior and exterior of a pedicle valve,  $\times 3$ , paratype, 116875d; (40) interior of the brachial valve showing the cardinalia,  $\times 3$ , paratype, 116875c.  
 Pratt Ferry formation (lower third), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.

- |   |      |
|---|------|
|   | Page |
| F. <i>Nothorthis transversa</i> Cooper, new species.....  | 315  |
| (41-43, 46) Respectively brachial, anterior, side, and posterior views of a small but complete individual, $\times 4$ , paratype, 117985d; (44, 45, 52, 53) respectively posterior, anterior, side, and brachial views of a specimen larger than the previous one, $\times 4$ , paratype, 117985a; (47-51) respectively posterior, anterior, side, pedicle, and brachial views of a large individual, $\times 4$ , holotype, 117986; (54, 56) interior of the brachial valve, $\times 4$ and $\times 6$ , showing the cardinalia, paratype, 117985b; (55) interior of another brachial valve showing incipient cardinal process, $\times 4$ , paratype, 117985c; (57, 58) interior of a brachial valve showing adductor scars, $\times 4$ , $\times 6$ , paratype, 117985e. |      |
| Horizon and locality same as preceding.   |      |

## PLATE 39

## CYRTONOTELLA, NICOLELLA, TAPHRORTHIS

- |  |     |
|--|-----|
| A. <i>Taphrorthis peculiaris</i> Cooper, new species.....  | 328 |
| (1, 5) Brachial interior and exterior, $\times 2$ , paratype, 109883b; (3) brachial exterior, $\times 1$ , of same; (2) another brachial interior, $\times 2$ , paratype, 109883e; (4, 6) exterior and interior of the pedicle valve, $\times 2$ , holotype, 109883c.  |     |
| Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.  |     |
| B. <i>Nicolella strasburgensis</i> Butts.....  | 318 |
| (10) Brachial exterior, $\times 1$ , lectotype, 97549a; (7) view of interareas, $\times 2$ , showing chilidial plates of lectotype; (9) another specimen showing chilidial plates, $\times 2$ , paratype, 97549c.  |     |
| Oranda formation, along the railroad $\frac{1}{4}$ mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.  |     |
| (8) Plasticine replica of the brachial exterior, $\times 1$ , hypotype, 109889b; (11) impression of the pedicle interior, $\times 1$ , hypotype, 109889a.  |     |
| Oranda formation, 1 mile northwest of Guilford Springs, $2\frac{1}{2}$ miles southwest of Chambersburg, Chambersburg (15') Quadrangle, Pa.   |     |
| C. <i>Cyrtototella subplana</i> Cooper, new species.....   | 323 |
| (12) Brachial interior showing cardinal process and chilidial plates, $\times 2$ , paratype, 109860b; (13-15) side, pedicle, and brachial views of a complete specimen, $\times 1$ , holotype, 109860a.  |     |
| Edinburg formation ( <i>Cyrtototella</i> zone), just above quarry, $\frac{1}{8}$ to $\frac{1}{4}$ mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.   |     |
| D. <i>Cyrtototella grandistriata</i> (Willard).....  | 321 |
| (16) Exterior of an imperfect pedicle valve showing alternate character of costellae, $\times 1$ , hypotype, 109846a; (17, 18) brachial and pedicle views of an imperfect specimen preserving both valves in contact, $\times 1$ , hypotype, 99262a; (19) brachial interior, $\times 2$ , hypotype, 109854a. |     |
| Effna formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.   |     |
| E. <i>Nicolella actoniae</i> (Sowerby).....  | 317 |
| (20) Brachial view showing interareas and chilidial structure, $\times 3$ , for comparison with <i>N. strasburgensis</i> above, figured specimen, 109888.  |     |
| Lyckholm formation (F1a), Moe near Taps, Estonia.  |     |

## PLATE 40

## CYRTONOTELLA, TAPHRORTHIS

- |  |     |
|--|-----|
| A. <i>Taphrorthis emarginata</i> Cooper, new species.....  | 327 |
| (1, 2) Pedicle and brachial views of a small specimen, $\times 1$ , paratype, 116889b; (9) same, $\times 2$ ; (6) another complete individual, $\times 1$ , paratype, 116889c. |     |

- |   | Page |
|---|------|
| Little Oak formation, on U. S. Highway 31, north of the bridge, Pelham, Bessemer Iron District (15') Quadrangle, Ala.   |      |
| (3-5, 7) Side, brachial, pedicle, and posterior views of a small but complete individual, $\times 2$ , paratype, 116891a; (8) fragment of brachial interior showing cardinalia, $\times 3$ , paratype, 116891d; (10) pedicle interior showing muscle scars, $\times 2$ , paratype, 116891c.   |      |
| Arline formation (lower part of <i>Christiania</i> beds), 100 yards southwest of the Negro Cemetery, $\frac{1}{2}$ mile northeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.  |      |
| B. <i>Cyrtototella subquadrata</i> Cooper, new species.....   | 324  |
| (11) Brachial view of a large, well-preserved specimen, $\times 1$ , holotype, 111803. Benbolt formation ( <i>Echinosphærites</i> beds), west slope of hill, $\frac{1}{2}$ mile east of Cedar Point School, Hilton (T.V.A. 197-NW) Quadrangle, Va.  |      |
| C. <i>Cyrtototella virginensis</i> Butts.....   | 325  |
| (12) Brachial interior showing cardinalia, $\times 2$ , hypotype, 109865a; (18) same, $\times 1$ ; (14) brachial exterior of an imperfect specimen, $\times 1$ , hypotype, 109865c. Botetourt formation, junction of Virginia Highways 311 and 114, $\frac{1}{2}$ mile southwest of Catawba, Salem (15') Quadrangle, Va.  |      |
| (13) Pedicle exterior, $\times 1$ , hypotype, 109868e; (15, 16) respectively $\times 1$ and $\times 2$ , enlargements of the brachial interior, hypotype, 109868a; (17) pedicle interior, $\times 1$ , hypotype, 109868b; (20) delthyrial area, $\times 2$ , of preceding. Arline formation, quarry on east side of Marion, Marion (T.V.A. 218-SE) Quadrangle, Va.  |      |
| (19) Exfoliated pedicle valve tilted to show umbonal region and impression of muscle scars, $\times 1$ , hypotype, 109870c. Botetourt formation, 5 miles east-northeast of Catawba, Salem (15') Quadrangle, Va.   |      |
| (21) Partially exfoliated pedicle valve showing outline, $\times 1$ , paratype, 109863. Botetourt formation, 4 miles east-northeast of Catawba, Salem (15') Quadrangle, Va.   |      |
| D. <i>Cyrtototella</i> cf. <i>C. virginensis</i> Butts.....   | 325  |
| (23, 24) Interior and exterior views of the brachial valve, $\times 1$ , figured specimen, 109872; (25) same, $\times 2$ ; (22) interarea of preceding, $\times 2$ , showing cardinal process; (26) details of cardinalia of same, $\times 3$ , showing small, nearly buried brachiophores and muscle scars. Arline formation, north side of wagon road in glade, $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn. |      |

## PLATE 41

## CYRTOTOTELLA

- |  |     |
|--|-----|
| A. <i>Cyrtototella fasciculata</i> Cooper, new species.....  | 320 |
| (1) Brachial exterior, $\times 1$ , holotype, 110356; (2, 3) respectively brachial and pedicle views, $\times 2$ , of the holotype. Benbolt formation, 4 miles east-northeast of Gate City, Gate City (T.V.A. 188-NE) Quadrangle, Va.                                |     |
| B. <i>Cyrtototella minor</i> Cooper, new species.....  | 323 |
| (4) Brachial view, $\times 1$ , of the holotype, 116900a; (5-7) pedicle, brachial, and posterior views, $\times 2$ , of the holotype. Lincolnshire formation, east side of the road $\frac{1}{4}$ mile north of Eidson, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn. |     |
| C. <i>Cyrtototella magna</i> Cooper, new species.....  | 322 |
| (8-10) Respectively pedicle, side, and brachial views of a medium-sized specimen, $\times 1$ , paratype, 116899a; (11) same as preceding, $\times 2$ .   |     |

	Page
Lower Sevier, $\frac{1}{4}$ mile northeast of Miser, Louisville (T.V.A. 138-SE) Quad- rangle, Tenn.	
(12, 13) Pedicle and brachial views of a larger complete specimen, $\times 1$ , para- type, 116897a; (14) same, $\times 2$ ; (15) brachial interior showing cardinalia, $\times 3$ , paratype, 116897c; (16) same in posterior view, $\times 3$ , showing cardinal process.	
Sevier shale, $\frac{1}{4}$ mile north of Gooseneck, in southwest corner Louisville (T.V.A. 138-SE) Quadrangle, Tenn.	
D. <i>Cyrtototella</i> cf. <i>C. magna</i> Cooper, new species.....	322
(17) Brachial exterior of a complete specimen, $\times 1$ , figured specimen, 110353a; (18, 19) brachial and posterior views, $\times 2$ , of the same specimen.	
Sevier formation, 2 miles southeast of Friendsville, Binfield (T.V.A. 139-NE) Quadrangle, Tenn.	
E. <i>Cyrtototella bella</i> (Schuchert and Cooper).....	319
(20-23) Respectively posterior, brachial, side, and pedicle views of a complete specimen, $\times 1$ , hypotype, 110348b; (24) another and larger specimen, $\times 1$ , hypo- type, 110348a; (25) same view, $\times 2$ .	
Lincolnshire formation (Hogskin member), Maynardville Pike, 1.7 miles north of Hall Crossroad, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.	

## PLATE 42

## NICOLELLA, ORTHAMBONITES, PTYCHOPLEURELLA

A. <i>Orthambonites minutus</i> Cooper, new species.....	305
(1, 2) Interior and exterior views of a brachial valve, $\times 4$ , paratype, 116883d; (3, 6) brachial and side views of a complete but small specimen, $\times 4$ , holotype, 116883c; (4) interior of pedicle valve, $\times 4$ , paratype, 116883a; (7) exterior, $\times 6$ , of same; (5) exterior of a pedicle valve, $\times 4$ , paratype, 116883b; (8, 9) exterior and interior of a large brachial valve, $\times 4$ , paratype, 116883e.	
McLish formation (bed 45), West Spring Creek, sec. 6, T. 2 S., R. 1 W., Murray County, Okla.	
B. <i>Ptychopleurella porcia</i> (Billings).....	389
(10, 11) Posterior and exterior views of a pedicle valve, $\times 1$ , holotype, G.S.C. 1044.	
St. Martin formation, Island of Montreal, Quebec, Canada.	
C. <i>Ptychopleurella lamellosa</i> (Raymond).....	387
(12) Brachial view of a silicified specimen, $\times 3$ , paratype, Y.P.M. 2706.	
Valcour formation ( <i>Stromatocerium</i> layers), Chazy, Rouses Point (15') Quadrangle, N. Y.	
D. <i>Ptychopleurella rectangulata</i> Cooper, new species.....	389
(13) Interior of pedicle valve, $\times 3$ , paratype, 110101b; (14) pedicle exterior, $\times 3$ , paratype, 110101d; (16) a large pedicle valve showing strong median rib, $\times 3$ , paratype, 110101c; (17) brachial interior, $\times 3$ , paratype, 110101e; (15, 18-21) posterior, brachial, pedicle, anterior, and side views of a complete specimen, $\times 3$ , holotype, 110101a.	
Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.	
E. <i>Ptychopleurella mediocostata</i> Cooper, new species.....	387
(22, 23) Posterior and interior views of a well-preserved pedicle valve showing apical plate in both views, $\times 3$ , holotype, 110097a; (24) pedicle exterior showing median rib, $\times 3$ , paratype, 110097b; (25, 27) brachial exterior and interior, $\times 3$ , paratype, 110097c; (26) an unusually wide pedicle valve, exterior, $\times 3$ , para- type, 110097d.	
Horizon and locality same as preceding.	

- |   | Page |
|---|------|
| F. <i>Ptychopleurella glypta</i> Cooper, new species.....   | 386  |
| (28-32) Respectively pedicle, side, brachial, posterior, and anterior views of a complete specimen, $\times 2$ , holotype, 116956a; (36-38) pedicle, anterior, and posterior views of the holotype, $\times 3$ , showing details of the ornamentation and apical plate in posterior view; (33-35) pedicle, side, and brachial views of a small individual showing lamellae, $\times 3$ , paratype, 116956b; (39) brachial interior, $\times 4$ , paratype, 116956d. |      |
| Lenoir formation (calcarenite beds below Mosheim limestone), on southwest side of the cemetery behind the Friends Church, north corner of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.   |      |
| G. <i>Ptychopleurella oklahomensis</i> Cooper, new species.....   | 388  |
| (40, 41) Exterior and posterior views of the pedicle valve, $\times 6$ , holotype, 110095b; (42) same, $\times 2$ ; (43) brachial valve, $\times 2$ , paratype, 110095a; (44) same, $\times 6$ , showing details of ornamentation.  |      |
| McLish formation, section along and west of U. S. Highway 77, sec. 25, T. 2 S., R. 1 E., Carter County, Okla.   |      |
| H. <i>Nicolella angulata</i> Cooper, new species.....   | 317  |
| (45, 47) Pedicle and brachial views of a complete but partially exfoliated valve, $\times 2$ , holotype, 116888; (46) same, $\times 1$ .  |      |
| Wappinger formation, Wappinger Creek at Rochdale, $\frac{1}{2}$ miles east-northeast of Poughkeepsie, Poughkeepsie (15') Quadrangle, N. Y.  |      |

## PLATE 43

## GLYPTORTHIS, PTYCHOPLEURELLA

- |  |     |
|--|-----|
| A. <i>Glyptorthis</i> sp. 3.....   | 382 |
| (1) Brachial view, $\times 2$ , of an incomplete specimen, figured specimen, 116951; (2, 3) pedicle and brachial views, $\times 1$ , of the same.  |     |
| Little Oak formation, cut on U. S. Highway 31, $\frac{1}{2}$ mile north of bridge at Pelham, Bessemer Iron District (15') Quadrangle, Ala.   |     |
| B. <i>Glyptorthis uncinata</i> Cooper, new species .....   | 377 |
| (4, 5) Side and pedicle views of a complete specimen, $\times 2$ , paratype, 116941a; (6, 7) interior and exterior of the brachial valve, $\times 2$ , paratype, 116941b.  |     |
| Lower Bromide (Mountain Lake member), McLish Ranch, sec. 24, T. 1 S., R. 7 E., Johnston County, Okla.  |     |
| C. <i>Glyptorthis costellata</i> Cooper, new species.....  | 366 |
| (8) Anterior view, $\times 6$ , showing ornamentation, holotype, 110052a.  |     |
| Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), branch of Hickory Creek, NW $\frac{1}{4}$ sec. 26, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.   |     |
| D. <i>Ptychopleurella globularis</i> Cooper, new species.....  | 385 |
| (9, 15, 17) Respectively side, brachial, and pedicle views of an imperfect specimen, $\times 3$ , paratype, 116954a; (10) brachial interior, $\times 3$ , paratype, 116954b; (11) pedicle interior, $\times 3$ , paratype, 116954c; (12, 14, 16) respectively brachial, posterior, and pedicle views of an imperfect specimen, $\times 3$ , paratype, 116954d; (13) brachial interior, $\times 2$ , paratype, 116954e. |     |
| Arline formation, 100 yards southwest of the Negro Cemetery, $\frac{1}{2}$ mile north-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.  |     |
| E. <i>Glyptorthis uniformis</i> Cooper, new species.....   | 378 |
| (18, 19, 21) Respectively brachial, pedicle, and side views of a complete specimen, $\times 1$ , paratype, 116944a; (20) brachial view, $\times 2$ , of the same.  |     |
| Base of Benbolt formation, west slope of the hill $\frac{1}{2}$ mile east of the Cedar Point School, Hilton (T.V.A. 197-NW) Quadrangle, Va.  |     |

- |  | Page |
|--|------|
| F. <i>Glyptorthis concinnula</i> Cooper, new species.....  | 365  |
| (22) Brachial exterior, $\times 1$ , paratype, 110027a; (23) brachial view of another specimen, $\times 2$ , paratype, 110027b; (24-28) respectively brachial, posterior, side, anterior, and pedicle views, $\times 2$ , of the holotype, 116931a.<br>Little Oak formation, Bailey road junction with main Cahaba Valley road, SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 19 S., R. 2 W., 1 $\frac{1}{4}$ miles northeast of Newhope Church, Vandiver (15') Quadrangle, Ala.                             |      |
| (29) Brachial interior, $\times 3$ , paratype, 110028a; (35-38) respectively side, pedicle, anterior, and brachial views of a complete specimen, $\times 2$ , paratype, 110028b;   |      |
| (39) brachial view, $\times 1$ , of same.<br>Horizon and locality same as preceding.   |      |
| (31-33) Respectively pedicle, side, and brachial views of a complete specimen, $\times 1$ , paratype, 110025a; (34) brachial view, $\times 2$ , of same.<br>Little Oak formation, $\frac{1}{2}$ mile north of Pelham and 660 feet east of road intersection of main Cahaba Valley road with Helena road, Bessemer Iron District (15') Quadrangle, Ala.   |      |
| (30) Brachial exterior of a large specimen, $\times 2$ , paratype, 110035a.<br>Basal Athens formation, 600 feet S. 40° E. of railroad crossing 1 mile north-east of courthouse in Athens, Athens (T.V.A. 125-NE) Quadrangle, Tenn.   |      |
| (40) Impression of a brachial interior, $\times 2$ , paratype, 110034b; (41) plasticine replica of the pedicle exterior, $\times 2$ , paratype, 110034g; (42) plasticine replica of the brachial exterior, $\times 2$ , paratype, 110034e; (43) impression of the pedicle interior showing form of muscle area, $\times 2$ , paratype, 110034a.<br>Basal Athens formation, just east of the road intersection 2 $\frac{1}{2}$ miles south-south-east of Riceville, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn. |      |

## PLATE 44

## GLYPTORTHIS

- |  |     |
|--|-----|
| A. <i>Glyptorthis alta</i> Cooper, new species.....  | 361 |
| (1-4) Respectively posterior, pedicle, side, and brachial views, $\times 1$ , of the holotype, 110008; (5) brachial interior, $\times 1$ , of the holotype.<br>Kimmswick formation, Goetz Quarry, Jefferson County, Mo.  |     |
| B. <i>Glyptorthis rara</i> Cooper, new species.....  | 372 |
| (6-10) Respectively posterior, anterior, side, brachial, and pedicle views, $\times 3$ , of the holotype, 110069a.<br>Benbolt formation, second road cut west of L. McDavid's house, 1 mile west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.   |     |
| C. <i>Glyptorthis crenulata</i> Cooper, new species.....   | 367 |
| (11, 12) Respectively $\times 1$ and $\times 2$ enlargements of a fine pedicle interior showing muscle scars, paratype, 110054; (13) brachial view of a complete specimen, $\times 1$ , holotype, 116932a; (14-18) respectively posterior, anterior, brachial, pedicle, and side views, $\times 2$ , of the holotype; (19) brachial interior, $\times 3$ , paratype, 116932b.<br>Bromide formation (Mountain Lake member—bed 8), cut on Oklahoma Highway 18, center NW $\frac{1}{4}$ sec. 11, T. 1 S., R. 3 E., 1.8 miles south-southeast of Sulphur, Murray County, Okla. |     |
| D. <i>Glyptorthis costellata</i> Cooper, new species.....  | 366 |
| (20) Brachial interior, $\times 2$ , paratype, 110038a; (21-25) respectively anterior, posterior, brachial, side, and pedicle views, $\times 2$ , of the holotype, 110052a; (26) the holotype, $\times 1$ .<br>(32, 33) Brachial view of a large specimen, $\times 1$ and $\times 2$ , paratype, 110059a;  |     |

(34, 35) respectively  $\times 1$  and  $\times 2$  views of a brachial valve, paratype, 110052b;  
(36) pedicle interior,  $\times 2$ , paratype, 110059b.

Bromide formation (Pooleville member—*Oxoplectica gouldi* zone), branch of Hickory Creek, NW $\frac{1}{4}$  sec. 26, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

(27-30) Respectively pedicle, side, posterior, and brachial views of a well-preserved specimen of medium size,  $\times 1$ , paratype, 110040a; (31) brachial view,  $\times 2$ ; of same; (37) enlargement,  $\times 4$ , of the brachial surface showing lamellae, paratype, 110040b.

Bromide formation (Pooleville member—*Oxoplectica gouldi* zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

## PLATE 45

## GLYPTORTHIS

- A. *Glyptorthis irregularis* Cooper, new species. . . . . 370  
(1, 3) Exterior of a pedicle valve,  $\times 2$  and  $\times 1$ , holotype, 116936a; (2) pedicle interior,  $\times 2$ , of holotype; (4, 5) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial exterior, paratype, 116936e; (6) brachial interior,  $\times 2$ , paratype, 116936d.  
Wardell formation, in Raccoon Valley,  $\frac{3}{4}$  mile northeast of Fleanor Mill, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.
- B. *Glyptorthis senecta* Cooper, new species. . . . . 373  
(7) Pedicle interior showing muscle scars,  $\times 2$ , holotype, 110070h; (8) pedicle exterior,  $\times 2$ , paratype, 110070i; (9) same as preceding,  $\times 1$ ; (10, 11) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial exterior, paratype, 110070g; (12) brachial exterior,  $\times 3$ , paratype, 110070d; (13) interior of a young brachial valve,  $\times 2$ , paratype, 110070f; (14) interior of a large brachial valve,  $\times 2$ , paratype, 110070c.  
Poteet formation (Yellow Branch member = 9-foot marble), on the road beside Yellow Branch, 5 miles southeast of Rose Hill, Rose Hill (T.V.A. 161-NE) Quadrangle, Va.
- C. *Glyptorthis assimilis* Cooper, new species. . . . . 361  
(15-19) Anterior, posterior, side, pedicle, and brachial views of a young, complete specimen,  $\times 2$ , paratype, 116928g; (20) brachial view of another specimen, younger than the preceding,  $\times 2$ , paratype, 116928i; (21) pedicle view of a very young individual,  $\times 2$ , paratype, 116928h; (22) pedicle exterior,  $\times 1$ , paratype, 110013b; (23, 24) respectively  $\times 2$  and  $\times 1$  enlargements of the brachial exterior, paratype, 110013d; (25) pedicle exterior,  $\times 1$ , paratype, 110013g; (26, 27) pedicle exterior and interior,  $\times 2$ , paratype, 110013c; (28) posterior portion of pedicle interior showing interarea and pedicle plate,  $\times 2$ , paratype, 116928f; (32) pedicle interior,  $\times 1$ , paratype, 116928c; (33) same,  $\times 2$ , showing fosses and apical plate; (34) delthyrial cavity of preceding enlarged  $\times 4$  to show apical plate; (35) brachial interior,  $\times 2$ , showing cardinalia, paratype, 110013f.  
Ridley formation (lower third), east side Marshall Knobs, 5 miles south of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.  
(29) Pedicle exterior,  $\times 2$ , of a large specimen, paratype, 110012c; (30, 31) respectively  $\times 1$  and  $\times 2$  enlargements of the interior of the preceding.  
Ridley formation, Murfreesboro, Tenn.

## PLATE 46

## GLYPTORTHIS

- |  | Page |
|--|------|
| A. <i>Glyptorthis</i> sp. 1.....   | 381  |
| (1, 4) Exterior and interior, $\times 2$ , of a well-preserved pedicle valve, figured specimens, 116948; (2, 3) respectively same views, $\times 1$ , as preceding.<br>Lower part of the dark shale beneath Eureka quartzite, north-facing nose of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.  |      |
| B. <i>Glyptorthis uncinata</i> Cooper, new species.....  | 377  |
| (5-7, 9, 10) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen, $\times 2$ , holotype, 116943a; (8) brachial view, $\times 1$ , of same.<br>Bromide formation (Mountain Lake member—middle of bed 6), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.  |      |
| C. <i>Glyptorthis uniformis</i> Cooper, new species.....   | 378  |
| (11) Brachial view, $\times 1$ , paratype, 116946b; (12-15) respectively anterior, posterior, pedicle, and side views of a complete specimen, $\times 3$ , paratype, 116946a; (16) brachial view, $\times 2$ , of same specimen; (17) pedicle view, $\times 3$ , of same.<br>Basal Benbolt formation, intersection of main road with lane to north, $\frac{1}{2}$ mile southwest of Fleanor Mill, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.   |      |
| D. <i>Glyptorthis subcarinata</i> Cooper, new species.....   | 374  |
| (18) Brachial view, $\times 1$ , holotype, 117987; (19-23) respectively posterior, side, anterior, pedicle, and brachial views, $\times 2$ , of the preceding.<br>Lower Sevier formation, $\frac{1}{4}$ mile northeast of Miser, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.  |      |
| E. <i>Glyptorthis sulcata</i> Cooper, new species.....   | 375  |
| (24-27) Respectively brachial, side, pedicle, and posterior views, $\times 1$ , of a complete specimen, holotype, 110075a; (28) brachial interior, $\times 2$ , paratype, 110075b; (30-34) pedicle, anterior, side, posterior, and brachial views, $\times 2$ , of holotype; (29) brachial interior, $\times 2$ , paratype, 110074.<br>Crown Point formation (bed B, division 3, of Brainerd and Seely), $\frac{1}{2}$ mile north of State Normal School, Plattsburg, Plattsburg (15') Quadrangle, N. Y. |      |
| F. <i>Glyptorthis multicostellata</i> Cooper, new species.....   | 371  |
| (35) Brachial exterior, $\times 1$ , paratype, 116938c; (40) interior, $\times 2$ , of same; (36, 39) respectively $\times 1$ and $\times 2$ enlargements of the pedicle exterior, holotype, 116938b; (37) exterior of a pedicle valve, $\times 1$ , paratype, 116938a; (38) pedicle interior, $\times 2$ , paratype, 116938e.<br>Ridley formation, on U. S. Highway 27, just northwest of Chickamauga Creek, Kensington (T.V.A. 106-SE) Quadrangle, Ga.   |      |
| G. <i>Glyptorthis</i> sp. 4.....   | 383  |
| (41, 42) Pedicle and brachial views of a complete specimen, $\times 4$ , figured specimens, 116952a.<br>McLish formation (zone 45), West Spring Creek, sec. 6, T. 2 S., R. 1 W., Murray County, Okla.  |      |

## PLATE 47

## GLYPTORTHIS

- |   |     |
|---|-----|
| A. <i>Glyptorthis bellatula</i> Cooper, new species.....  | 364 |
| (1) Brachial exterior, $\times 1$ , paratype, 110015d; (2) pedicle exterior $\times 1$ , holotype, 110015a; (3) interior, $\times 2$ , of same; (4, 6) exterior and interior of the brachial valve, $\times 2$ , paratype, 110015e; (5) posterior part of brachial interior showing |     |



- cardinalia,  $\times 2$ , paratype, 110015h; (7) pedicle exterior,  $\times 2$ , paratype, 110015g; (8) enlargement of exterior,  $\times 4$ , paratype, 110015f.
- Chatham Hill formation, Virginia Highway 113 (Marion to Chatham Hill road) 6 miles north of Marion, Chatham Hill (T.V.A. 218-NE) Quadrangle, Va.
- B. *Glyptorthis obesa* Cooper, new species..... 372  
 (9, 11) Exterior and side views,  $\times 1$ , of the pedicle valve, holotype, 110068d; (10) brachial exterior,  $\times 1$ , paratype, 110068c; (12) brachial interior,  $\times 2$ , paratype, 110068a.  
 Bromide formation (Mountain Lake member), a little north of the middle of sec. 32, T. 2 S., R. 2 E., 2 to 3 miles northeast of Springer, Carter County, Okla.
- C. *Glyptorthis uniplicata* Cooper, new species..... 379  
 (13) Pedicle exterior,  $\times 2$ , paratype, 116947a; (14, 15) respectively  $\times 1$  and  $\times 2$  enlargements of an imperfect brachial valve, paratype, 116947c; (16) pedicle exterior,  $\times 2$ , holotype, 116947b; (17) enlargement,  $\times 3$ , of the ornamentation of the holotype.  
 Benbolt formation (basal part of *Echinosphaerites* bed directly overlying the marble),  $\frac{1}{4}$  mile east of Speers Ferry, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- D. *Glyptorthis equiconvexa* Cooper, new species..... 368  
 (18-21) Respectively pedicle, posterior, side, and brachial views of a large complete specimen,  $\times 1$ , holotype, 116934b; (30) enlargement,  $\times 2$ , of anterior of holotype, showing ornamentation; (22-24) respectively brachial, pedicle, and posterior views of an imperfect specimen preserving both valves in contact,  $\times 1$ , paratype, 116934a; (25, 26) internal impression of the pedicle valve,  $\times 1$  and  $\times 2$ , prepared by burning shell, paratype, 116934c; (28) plasticine replica of the pedicle interior,  $\times 2$ , prepared from preceding impression; (27) brachial internal impression,  $\times 1$ , opposite side of paratype, 116934c; (29) plasticine replica of brachial interior,  $\times 2$ , prepared from preceding impression.  
 Shippensburg formation (Pinesburg member—*Echinosphaerites* zone), west bank of Conococheague Creek, road cut on U. S. Highway 40, at Wilson, 7 miles west of Hagerstown, Md.

## PLATE 48

## ERIDORTHIS, GLYPTORTHIS

- A. *Eridorthis inexpecta* Cooper, new species..... 384  
 (1) Pedicle exterior,  $\times 1$ , holotype, 110104a; (2, 3) side and exterior views of a large brachial valve,  $\times 1$ , paratype, 110106b; (4, 5) two smaller brachial valves,  $\times 1$ , paratypes, 110106e, 110106d; (6) pedicle exterior,  $\times 1$ , paratype, 110106c.  
 Effna formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- B. *Glyptorthis glypta* Cooper, new species..... 369  
 (7) Brachial exterior,  $\times 2$ , holotype, 110067c; (8) pedicle interior showing narrow diductor scars,  $\times 2$ , paratype, 110067f; (9, 10) posterior and exterior of a pedicle valve,  $\times 2$ , paratype, 110067e; (11) brachial interior,  $\times 3$ , paratype, 110067d.  
 Effna-Rich Valley formations, locality same as above.
- C. *Glyptorthis bellarugosa* (Conrad)..... 363  
 (12) Pedicle interior,  $\times 2$ , paratype, A.M.N.H. (not numbered); (13, 14, 16-18) respectively anterior, posterior, side, pedicle, and brachial views,  $\times 2$ , of the lectotype, A.M.N.H. 909/1; (15) lectotype,  $\times 1$ .

	Page
Decorah formation (Ion member ?), Mineral Point, Mineral Point (30') Quadrangle, Wis.	
D. <i>Glyptorthis virginica</i> Cooper, new species.....	379
(19-23) Respectively pedicle, brachial, anterior, side, and posterior views, $\times 1$ , of the holotype, 98209a; (24) pedicle interior, showing muscle scars, $\times 2$ , paratype, 98209d; (25, 26, 28, 29) respectively posterior, brachial, side, and pedicle views of a small but complete specimen, $\times 1$ , paratype, 110082e; (33) enlargement, $\times 6$ , of exterior of same; (27) brachial exterior, $\times 2$ , paratype, 110082c; (30) pedicle interior showing muscle scars, $\times 2$ , paratype, 110082d; (31, 32) brachial interiors, $\times 2$ , paratypes, 110082b, 110082a.	
Wardell formation, near the road beside Lloyd Carter's barn, 0.8 mile (by road), northeast of the Brick School at Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.	

## PLATE 49

GLYPTORTHIS, HESPERORTHIS, ORTHAMBONITES, PRODUCTORTHIS, PTYCHOPLEURELLA,  
TAPHRORTHIS

A. <i>Productorthis americana</i> Cooper, new species.....	336
(1, 2) Respectively $\times 2$ and $\times 1$ views of the brachial exterior showing the lamellae, paratype, 116887; (3, 4) respectively $\times 2$ and $\times 1$ views of the interior of the preceding specimen showing the cardinalia.	
Little Oak formation, road cut on U. S. Highway 31, $\frac{1}{2}$ mile north of Pelham, Bessemer Iron District (15') Quadrangle, Ala.	
B. <i>Taphrorthis emarginata</i> Cooper, new species.....	327
(5-9) Respectively posterior, anterior, side, pedicle, and brachial views of a complete specimen, $\times 1$ , holotype, 116889a; (10) brachial view, $\times 2$ , of the same specimen, showing details of the ornamentation.	
Horizon and locality same as preceding.	
C. <i>Hesperorthis australis</i> Cooper, new species.....	345
(11-15) Respectively brachial, anterior, side, posterior, and pedicle views of a complete and perfect specimen, $\times 1$ , paratype, 116914.	
Wardell part of Dryden formation, North of Gap Creek, $1\frac{1}{2}$ miles west of Arthur, Cumberland Gap (T.V.A. 153-SW) Quadrangle, Tenn.	
D. <i>Orthambonites tennesseensis</i> Cooper, new species.....	313
(16) Complete specimen seen in brachial view, $\times 1$ , paratype, 116880; (17-21) respectively anterior, posterior, side, brachial, and pedicle views, $\times 2$ , of the preceding.	
Little Oak formation, cut on U. S. Highway 31, $\frac{1}{2}$ mile north of Pelham, Bessemer Iron District (15') Quadrangle, Ala.	
E. <i>Glyptorthis</i> sp. 2.....	382
(22-26) Respectively pedicle, posterior, side, anterior, and brachial views of a complete specimen, $\times 2$ , figured specimen, 116949a.	
Lincolnshire formation (Hogskin member), 1.7 miles northeast of Hall Cross-road, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.	
F. <i>Glyptorthis assimilis</i> Cooper, new species.....	361
(27-31) Respectively brachial, posterior, anterior, side, and pedicle views of a large perfect specimen, $\times 1$ , holotype, 110013j; (32) brachial view, $\times 2$ , of holotype.	
Ridley formation (lower third), east side of Marshall Knobs, 5 miles south of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.	
G. <i>Glyptorthis subcircularis</i> Cooper, new species.....	374
(33-37) Respectively posterior, pedicle, side, brachial, and anterior views, $\times 1$ , of the holotype, 84015.	
Decorah formation (Ion member), Decorah, Iowa.	

	Page
(38) Interior of the pedicle valve showing large muscle scars and teeth, $\times 1$ , paratype, 116940b; (39, 40) respectively $\times 2$ and $\times 1$ views of the brachial interior showing cardinalia, paratype, 116940a. Decorah formation (Ion member), cut on county road 1.1 miles east of U. S. Highway 52, on south edge of Cannon Falls, Minn.	
H. <i>Ptychopleurella uniplicata</i> Cooper, new species.....	391
(41, 42) Respectively exterior and interior of the brachial valve showing the cardinalia, $\times 3$ , paratype, 110110b; (43, 44) exterior and interior of the pedicle valve, $\times 3$ , holotype, 110110a. Benbolt formation, 1½ miles west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.	
I. <i>Glyptorthis uniformis</i> Cooper, new species.....	378
(45-49) Respectively pedicle, posterior, side, anterior, and brachial views, $\times 1$ , of the holotype, 116945a; (51) pedicle view, $\times 2$ , of the holotype, to show the ornamentation; (50) interior of the brachial valve, $\times 2$ , paratype, 116945b. Benbolt formation, on the north side of U. S. Highway 19, 1¼ miles southeast of Hansonville Post Office, Brumley (T.V.A. 205-SE) Quadrangle, Va.	
PLATE 50	
ATELELASMA, CYRTONOTELLA, DESMORTHIS, EREMOTOECHIA, GLYPTORTHIS, HESPERORTHIS, PTYCHOPLEURELLA	
A. <i>Cyrtototella magna</i> Cooper, new species.....	322
(1-5) Respectively brachial, pedicle, posterior, anterior, and side views of a fine, complete specimen, $\times 1$ , holotype, 116897b; (6) brachial interior, $\times 2$ , paratype, 116898. Sevier shale, east side of the road 0.2 mile north-northwest of Gooseneck, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.	
B. <i>Eremotoechia silicica</i> Cooper, new species.....	515
(7) Brachial view of a complete specimen, $\times 1$ , paratype, 117063. Arline formation, 100 yards southwest of the Negro Cemetery, ½ mile northeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
C. <i>Hesperorthis</i> sp. 2.....	360
(8-12) Respectively side, anterior, posterior, pedicle, and brachial views of a complete specimen, $\times 2$ , figured specimen, 116926; (13) brachial view, $\times 1$ , of same. Edinburg formation (about the middle of the <i>Nidulites</i> zone), beside the road at the lower end of Tumbling Run, 1½ miles southwest of Strasburg, Strasburg (15') Quadrangle, Va.	
D. <i>Glyptorthis</i> sp. 3.....	382
(14-18) Respectively brachial, posterior, anterior, pedicle, and side views of a complete specimen, $\times 2$ , figured specimen, 116950. Little Oak formation, junction of Bailey Road and main road, SW¼SW¼ sec. 13, T. 19 S., R. 2 W., 1¼ miles northeast of Newhope Church, Vandiver (15') Quadrangle, Ala.	
E. <i>Glyptorthis uncinata</i> Cooper, new species.....	377
(19-23) Respectively pedicle, posterior, side, anterior, and brachial views of a complete specimen, $\times 2$ , paratype, 116942. Bromide formation (Mountain Lake member), Nebo, Murray County, Okla.	
F. <i>Glyptorthis transversa</i> Cooper, new species.....	376
(24-28) Respectively pedicle, anterior, side, posterior, and brachial views of a complete specimen, $\times 2$ , holotype, 116939.	

	Page
St. Martin formation, Belanger, 2 miles south of Cap St. Martin, Quebec, Canada.	
G. <i>Atelelasma platys</i> Cooper, new species.....	523
(29, 30) Two views of the pedicle interior, $\times 2$ , tipped to show spondylium, holotype, 110144; (31) brachial interior, $\times 2$ , of the holotype; (32, 33) brachial and pedicle views, $\times 2$ , of the holotype; (34) same, $\times 1$ .	
Lincolnshire formation (Hogskin member), on the Maynardville Pike, 1.7 miles northeast of Hall Crossroad, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.	
H. <i>Desmorthis nevadensis</i> Ulrich and Cooper.....	447
(35-39) Respectively anterior, pedicle, posterior, brachial, and side views of a complete but somewhat exfoliated specimen, $\times 2$ , hypotype, 110817a.	
Joins formation (about 20 feet above the base), $\frac{1}{4}$ mile west of U. S. Highway 77, sec. 25, T. 2 S., R. 1 E., Carter County, Okla.	
I. <i>Ptychopleurella sulcata</i> Cooper, new species.....	390
(40) Pedicle exterior, $\times 2$ , paratype, 110108b; (41) brachial exterior, $\times 2$ , holotype, 110108a.	
Oranda formation, $\frac{1}{2}$ mile west of Strasburg, Strasburg (15') Quadrangle, Va.	
J. <i>Desmorthis costata</i> Cooper, new species.....	446
(42-46) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen, $\times 2$ , holotype, 110813a.	
Joins formation, SW $\frac{1}{4}$ sec. 2, T. 1 S., R. 1 W., about 4 miles east of Hennepin, Murray County, Okla.	
K. <i>Hesperorthis quadrata</i> Cooper, new species.....	355
(47-49) Respectively brachial, pedicle, and side views, $\times 1$ , holotype, 116921; (50-54) respectively pedicle, anterior, posterior, side, and brachial views, $\times 2$ , of the same.	
Lebanon formation, cut on U. S. Highway 241, 2.1 miles north of Bedford County line, in Rutherford County, Tenn.	

## PLATE 51

## HESPERORTHIS

A. <i>Hesperorthis biconvexa</i> Cooper, new species.....	346
(1) Pedicle interior, showing small muscle area, $\times 1$ , holotype, 109962; (2-4) pedicle, brachial, and side views, $\times 1$ , of the holotype; (5) brachial interior, $\times 1$ , of the holotype; (6) interior of an imperfect pedicle valve showing muscle scars, $\times 3$ , paratype, 109964.	
Lincolnshire formation, $\frac{1}{2}$ mile north of Eidson, along an old lane, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.	
B. <i>Hesperorthis dubia</i> Cooper, new species.....	351
(7-10) Respectively pedicle, brachial, side, and posterior views of a nearly perfect specimen, $\times 1$ , holotype, 116919; (11-13) respectively posterior, brachial, and anterior views, $\times 2$ , of the same specimen.	
Lower Sevier formation, $\frac{1}{4}$ mile northeast of Miser, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.	
C. <i>Hesperorthis multicostata</i> Cooper, new species.....	354
(14) Brachial view, $\times 2$ , of the holotype, 109986; (15-18) respectively side, pedicle, brachial, and anterior views, $\times 1$ , of the holotype.	
Lincolnshire formation (cherty bed at base of "Ottosee"), Evans Ferry, U. S. Highway 25E, about 1 mile north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.	

- |   | Page |
|---|------|
| D. <i>Hesperorthis virginiensis</i> Cooper, new species.....  | 359  |
| (19, 20) Pedicle and brachial views of a complete specimen, $\times 1$ , paratype, 97598.<br>Oranda formation (lower part), on County Road 777 just west of its junction with County Road 617 = 910, about $\frac{1}{2}$ mile north of Greenmount Church, about 4 to 5 miles north of Harrisonburg, Broadway (15') Quadrangle, Va.  |      |
| E. <i>Hesperorthis concava</i> Cooper, new species.....   | 348  |
| (21-25) Respectively anterior, pedicle, side, posterior, and brachial views, $\times 1$ , holotype, 83842; (26) brachial view, $\times 2$ , of same.<br>Platteville formation (McGregor member), quarry on south side of Ellenboro Hill, about half way between Lancaster and Platteville, beside the main road a short distance north of the bridge, Lancaster (30') Quadrangle, Wis.  |      |
| F. <i>Hesperorthis ignicula</i> (Raymond).....  | 352  |
| (27) Inner filling showing brachial interior impression and part of the pedicle interior, $\times 2$ , hypotype, 109925a; (28) plasticine replica of the brachial interior, $\times 2$ , prepared from the preceding impression; (34) plasticine replica of the brachial exterior, $\times 2$ , prepared from specimen 109925b.<br>Valcour formation, on New York Highway 22, 1 mile southeast of Beekmantown, Rouses Point (15') Quadrangle, N. Y.<br>(29, 30) Respectively pedicle and brachial views of a complete specimen, $\times 1$ , lectotype, Carnegie Mus. 5453; (31, 32) pedicle and side views of a smaller complete specimen, $\times 1$ , paratype, Carnegie Mus. 5527; (33) pedicle view, $\times 2$ , of preceding.<br>Valcour formation, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y. |      |

## PLATE 52

## HESPERORTHIS

- |   |     |
|---|-----|
| A. <i>Hesperorthis longirostris</i> Cooper, new species.....  | 352 |
| (1, 7) Pedicle and brachial exteriors, $\times 1$ , paratype, 116920e.<br>Whistle Creek formation, on U. S. Highway 60, 100 yards southeast of Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.<br>(2-5) Respectively brachial, pedicle, side, and posterior views, $\times 1$ , of the holotype, 98180a; (6) brachial interior, $\times 2$ , paratype, 109934i.<br>Whistle Creek formation, along Whistle Creek, $1\frac{1}{2}$ to 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.               |     |
| B. <i>Hesperorthis crinerensis</i> Cooper, new species.....   | 350 |
| (8, 9) Brachial and pedicle views, $\times 1$ , of a complete specimen, holotype, 110004a; (10-14) respectively anterior, brachial, side, posterior, and pedicle views, $\times 2$ , of the same specimen; (15) brachial interior, $\times 2$ , paratype, 110004b.<br>Bromide formation (Mountain Lake member—middle of zone 7 of Decker), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.   |     |
| C. <i>Hesperorthis tricenaria</i> (Conrad).....   | 358 |
| (16) Posterior view, $\times 2$ , of a pedicle valve showing pseudodeltidium and lateral plates, hypotype, 109982a.<br>Barnhart formation, on the old road 1 mile northwest of the Chicago Summer School Camp, NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 32, T. 37 N., R. 9 E., Weingarten (15') Quadrangle, Mo.<br>(17-21) Respectively anterior, posterior, pedicle, side, and brachial views of a complete specimen, $\times 1$ , hypotype, 24752a.<br>Decorah formation (Guttenberg member), Platteville, Mineral Point (30') Quadrangle, Wis. |     |

- Page  
356
- D. *Hesperorthis sulcata* Cooper, new species.....
- (22, 23) Brachial interior,  $\times 2$  and  $\times 1$ , showing long brachiophores, paratype, 109987a; (24-28) respectively posterior, anterior, side, brachial, and pedicle views,  $\times 2$ , of the holotype, 109987b; (29-32) respectively brachial view  $\times 1$  and  $\times 2$ , pedicle view,  $\times 1$ , and posterior view,  $\times 2$ , of a large, complete specimen with attached cluster of *Skenidioides*, paratype, 109987d; (33, 35) brachial and posterior views of a complete specimen,  $\times 1$ , paratype, 109992e; (34, 36) brachial and anterior views,  $\times 2$ , of same.
- Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), branch of Hickory Creek, NW $\frac{1}{4}$  sec. 26, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.
- (37) Brachial exterior,  $\times 2$ , of a young specimen, showing sulcus and ornamentation, paratype, 109994b.
- Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

## PLATE 53

## HESPERORTHIS

- A. *Hesperorthis australis* Cooper, new species..... 345
- (1, 2) Respectively interior and exterior of a large brachial valve,  $\times 1$ , paratype, 116912a; (3-5) respectively lateral, interior, and exterior views of the pedicle valve,  $\times 1$ , paratype, 116912c; (28) posterior of pedicle valve showing pseudodeltidium and lateral plates,  $\times 2$ , paratype, 116912b.
- Wardell formation (*Hesperorthis* bed), north quarry on Station Creek,  $\frac{1}{4}$  mile south of U. S. Highway 58, 2 miles east of Cumberland Gap, Wheeler (T.V.A. 153-SE) Quadrangle, Va.
- (6-9) Respectively brachial, pedicle, side, and posterior views of a complete specimen,  $\times 1$  holotype, 109927a; (19) posterior view of a complete specimens,  $\times 3$ , paratype, 109927b.
- (10) Well-preserved pedicle valve,  $\times 1$ , paratype, 109928a; (26) posterior portion of an old individual showing thickened cardinalia,  $\times 3$ , paratype, 109928f.
- Wardell formation, on old Tennessee Highway 33 between Big and Little Barren Creeks, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.
- (11) Brachial exterior of a small specimen,  $\times 1$ , paratype, 116909a; (12, 13, 14) respectively pedicle, side, and brachial views,  $\times 2$ , of same; (15-18) respectively interior, posterior, side, and partial side views of the brachial interior to show brachiophores,  $\times 2$ , paratype, 116909d; (24) brachial interior of another specimen showing long brachiophores,  $\times 2$ , paratype, 116909c; (27) pedicle interior showing muscle scars and pseudodeltidium,  $\times 2$ , paratype, 116909b.
- Ridley formation (lower third), Marshall Knobs, 5 miles south of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.
- (20-22) Respectively brachial, side, and posterior views of a complete individual,  $\times 1$ , paratype, 71965b.
- Wardell formation, Clinch River, 12 miles northeast of Liberty Hill, probably Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.
- (23) Pedicle interior, showing pseudodeltidium,  $\times 2$ , paratype, 109906c; (25) brachial interior,  $\times 2$ , paratype, 109906g; (29) brachial interior,  $\times 3$ , showing thickened cardinal process, paratype, 109906i; (31) brachial interior,  $\times 3$ , showing accessory muscle attachments at base of cardinal process, paratype, 109906h.
- Ridley? = Wardell formation, on U. S. Highway 27, 1 mile north of Rock Spring, Nickajack Gap (T.V.A. 113-SW) Quadrangle, Ga.

(30) Anterior view,  $\times 3$ , of a large specimen showing projections on inner surfaces of interior ribs corresponding to exterior grooves between costae; these function as a sort of strainer of incoming water currents, paratype, 116914.

Wardell formation (*Hesperorthis* bed), north of canyon of Gap Creek,  $1\frac{1}{2}$  miles west of Arthur, Cumberland Gap (T.V.A. 153-SW) Quadrangle, Tenn.

## PLATE 54

## HESPERORTHIS

- |   | Page |
|---|------|
| A. <i>Hesperorthis matulina</i> Cooper, new species.....  | 353  |
| (1) Brachial exterior, $\times 1$ , paratype, 109975a; (2) pedicle exterior, $\times 1$ , holotype, 109975b; (3) brachial interior, $\times 2$ , paratype, 109975c; (4) pedicle interior, $\times 2$ , paratype, 109975c.<br>Tulip Creek formation, northeast corner sec. 1, T. 2 S., R. 2 W., $2\frac{1}{2}$ miles east of Pooleville, Murray County, Okla.  |      |
| B. <i>Hesperorthis disparilis</i> (Conrad) = <i>H. tricenaria</i> (Conrad).....   | 358  |
| (5) Brachial view of the holotype, $\times 1$ , A.M.N.H. 911/1; (6-10) respectively pedicle exterior, posterior, anterior, side, and brachial exterior, $\times 2$ , of the holotype.<br>Probably Decorah formation (Guttenberg member), Mineral Point, Mineral Point (30') Quadrangle, Wis.  |      |
| C. <i>Hesperorthis concava</i> Cooper, new species.....   | 348  |
| (11) Brachial exterior of a complete specimen, $\times 1$ , paratype, 116917; (12-15) respectively brachial, side, pedicle, and posterior views, $\times 2$ , of the same specimen.<br>Chaumont formation, loose in the bed of Black River, just below the dam at the head of the island, Watertown, Watertown (15') Quadrangle, N. Y.  |      |
| D. <i>Hesperorthis colei</i> Cooper, new species.....   | 347  |
| (16) Brachial exterior, $\times 1$ , holotype, 48796; (17-21) respectively pedicle, anterior, posterior, brachial, and side views, $\times 2$ , of the same specimen.<br>Decorah formation (Ion member), 8 miles south of Cannon Falls, Minn.   |      |
| E. <i>Hesperorthis tenuicostata</i> Cooper, new species.....  | 357  |
| (22-26) Respectively brachial, anterior, side, posterior, and pedicle views, $\times 1$ , of the holotype, 116924; (27-31) respectively posterior, side, anterior, brachial, and pedicle views, $\times 2$ , of the same specimen.<br>Lenoir formation (shaly beds with <i>Hesperorthis</i> near middle of quarry), quarry on the north side of U. S. Highway 11, $1\frac{1}{2}$ miles southwest of Philadelphia, Philadelphia (T.V.A. 131-NW) Quadrangle, Tenn.<br>(32-34) Respectively posterior, brachial, and side views of another complete specimen, $\times 1$ , paratype, 109973a; (36-40) respectively brachial, anterior, posterior, pedicle, and side views, $\times 2$ , of the preceding.<br>Lenoir formation, road on North Fork, 3 miles south-southeast of North Fork, Christiansburg (30') Quadrangle, Va. |      |
| (35) Brachial interior, $\times 2$ , paratype, 109970a.<br>Lenoir formation (25 feet above the Knox dolomite), Sweetwater, Sweetwater (T.V.A. 131-SW) Quadrangle, Tenn.   |      |
| F. <i>Hesperorthis</i> sp. 1.....   | 360  |
| (41) Brachial exterior, $\times 2$ , figured specimen, 109972.<br>Botetourt formation, junction of Virginia Highways 311 and 114, $\frac{1}{2}$ mile southwest of Catawba, Salem (15') Quadrangle, Va.  |      |

PLATE 55  
SCAPHORTHIS

- |   | Page |
|---|------|
| A. <i>Scaphorthis virginiensis</i> Cooper, new species.....   | 505  |
| (1, 2) Respectively $\times 2$ and $\times 1$ enlargement of a brachial valve, paratype, 111788c; (3, 5, 6) respectively pedicle, side, and brachial views of a small but complete specimen, $\times 1$ , paratype, 111788a; (4) pedicle exterior, $\times 1$ , paratype, 116903a; (7, 8) brachial interior tilted to show cardinalia and in normal view, $\times 2$ , holotype, 116903c; (9) pedicle interior showing thickened and wide adductor track, $\times 2$ , paratype, 116903b; (10) posterior of the brachial interior showing cardinalia, $\times 3$ , paratype, 111788e; (11) pedicle exterior, $\times 1$ , paratype, 116903e.  |      |
| Chatham Hill formation, 1.2 miles S. $31^{\circ}$ E. of Sharon Springs, on north slope of Walker Mountain, Burkes Garden (15') Quadrangle, Va.  |      |
| B. <i>Scaphorthis perplexa</i> Cooper, new species.....   | 504  |
| (12) Pedicle interior, $\times 2$ , paratype, 111802d; (13-17) respectively pedicle, side, anterior, posterior, and brachial views, $\times 2$ , of the holotype, 111802c; (18, 19) pedicle and brachial views of a smaller complete individual, $\times 2$ , paratype, 111802k; (20) pedicle interior, $\times 2$ , paratype, 111802t; (22) brachial interior, $\times 3$ , paratype, 111802-l; (21) brachial interior, $\times 2$ , paratype, 111802u; (23) another brachial interior with cardinal process, $\times 2$ , paratype, 111802s; (24-26) three views of the same specimen, an old individual showing thickening around the muscle area, $\times 4$ , paratype, 111802r. |      |
| Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.   |      |
| C. <i>Scaphorthis</i> sp. 1.....  | 506  |
| (27-29) Pedicle, brachial, and side views, $\times 2$ , figured specimen, 116908a.  |      |
| Horizon and locality same as preceding.   |      |
| D. <i>Scaphorthis kayi</i> Cooper, new species.....   | 503  |
| (31-35) Respectively brachial, posterior, anterior, side, and pedicle views of an exceptionally well preserved individual, $\times 1$ , holotype, 111787.   |      |
| Lower Edinburg formation, $\frac{1}{2}$ mile nearly north of Glendale School, 500 to 600 feet S. $70^{\circ}$ W., of farmhouse at end of lane, Winchester (15') Quadrangle, Va.   |      |
| (36, 37) Respectively $\times 1$ and $\times 2$ enlargements of a brachial interior, paratype, 116905.  |      |
| Lower Edinburg formation ( <i>Cyrtonotella</i> zone), 10 to 20 feet above sandy bed, 500 feet southeast of U. S. Highway 11, 1 mile northeast of Toms Brook, Strasburg (15') Quadrangle, Va.  |      |
| (30) Brachial exterior, $\times 1$ , paratype, 116907a; (38, 39) respectively $\times 2$ and $\times 1$ enlargement of an impression of the pedicle interior, showing pallial trunks, paratype, 116907d.  |      |
| Lower Edinburg formation, $\frac{3}{8}$ mile north-northeast of Glendale School, Winchester (15') Quadrangle, Va.   |      |
| (40) Pedicle exterior, $\times 1$ , paratype, 116906a; (41) enlargement, $\times 3$ , of left side of the preceding specimen.   |      |
| Shippensburg formation, $1\frac{3}{4}$ miles west of Kauffman and $3\frac{1}{2}$ miles north of Greencastle, Chambersburg (15') Quadrangle, Pa.   |      |

PLATE 56

MULTICOSTELLA, PRODUCTORTHIS

- |  |     |
|--|-----|
| A. <i>Productorthis americana</i> Cooper, new species.....                           | 336 |
| (1-4) Respectively posterior, pedicle, brachial, and side views, $\times 1$ , of the |     |



holotype, 98184a; (5) specimen with valves naturally separated showing chilidial plate, interarea, and delthyrium,  $\times 2$ , paratype, 98184b.

Arline formation, old quarry on the north side of Marion, Marion (T.V.A. 218-SE) Quadrangle, Va.

B. *Productorthis agilera* (Willard)..... 335

(7, 25) Pedicle and posterior views of the cardinalia,  $\times 2$ , hypotype, 109890a; (8-11) respectively side, pedicle, posterior, and brachial views of an exfoliated specimen,  $\times 1$ , figured specimen, 109899a; (12) exterior of a brachial valve,  $\times 1$ , hypotype, 109891a; (13) brachial interior showing adductor scars,  $\times 1$ , hypotype, 109891g; (14, 15) pedicle interiors,  $\times 1$ , hypotypes, 109891f, 109890b; (18) brachial exterior,  $\times 1$ , hypotype, 109890c; (21-24) respectively pedicle, posterior, side, and brachial views of an unusually fine complete specimen,  $\times 1$ , hypotype, 109890d.

Effna formation (slope of reef), Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.

(6) Posterior view of the cardinal process,  $\times 4$ , hypotype, 109895a; (19) brachial exterior,  $\times 1$ , of same; (16) brachial view of a complete but exfoliated specimen,  $\times 1$ , hypotype, 109895c; (17) impression of the pedicle interior prepared by burning shell,  $\times 1$ , hypotype, 109896; (20) pedicle exterior of an exfoliated specimen,  $\times 1$ , hypotype, 109895b.

Effna formation, McNutt Quarry, 6 miles (airline) southeast of Ceres and 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.

C. *Multicostella fasciculata* (Butts)..... 418

(26, 27) Pedicle and brachial views,  $\times 1$ , of the holotype, 71493; (28) brachial view,  $\times 2$ , of same.

Little Oak formation,  $\frac{1}{2}$  mile north of Pelham, 660 feet east of the intersection of main Cahaba Valley road with Helena road, Bessemer Iron District (15') Quadrangle, Ala.

PLATE 57

DINORTHIS

A. *Dinorthis atavoides* Willard..... 393

(1-4) Respectively pedicle, brachial, posterior, and side views of a large specimen,  $\times 1$ , hypotype, 98216a.

Lincolnshire formation, Marcem Quarry, 2 miles west of Gate City, Gate City (T.V.A. 188-NE) Quadrangle, Va.

(5-9) Respectively posterior, brachial, pedicle, side, and anterior views of a perfect specimen,  $\times 1$ , hypotype, 110283k; (10) brachial interior,  $\times 2$ , hypotype, 110283e; (11) pedicle interior showing muscle area and scars,  $\times 2$ , hypotype, 110283g.

Lincolnshire formation,  $\frac{1}{2}$  mile north of Eidson, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.

B. *Dinorthis sweeneyi* (N. H. Winchell)..... 397

(12) Pedicle interior,  $\times 1$ , showing muscle scars and small pseudodeltidium, figured specimen, 48861; (13) posterior of pedicle valve,  $\times 2$ , showing interarea, and small pseudodeltidium of same specimen.

Decorah formation (Ion member), St. Paul, Minn.

C. *Dinorthis holdeni* (Willard)..... 395

(14) Pedicle interior,  $\times 1$ , hypotype, 110304f; (15, 28) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior, hypotype, 110304g; (27) brachial interior,  $\times 2$ , hypotype, 110304d; (16) pedicle exterior,  $\times 1$ , hypotype, 110304e.

Elway formation, on the road to Mountain Lake, at the road fork,  $\frac{1}{2}$  mile north

of the highway, at the base of the mountain,  $1\frac{1}{2}$  miles northwest of Newport, Giles County, Va.

- (17-21) Respectively side, pedicle, brachial, anterior, and posterior views of a complete specimen,  $\times 1$ , hypotype, 110302a; (22) pedicle view,  $\times 2$ , of same specimen; (23) brachial interior,  $\times 2$ , hypotype, 110301d; (24) pedicle interior,  $\times 2$ , hypotype, 110301b; (26) posterior of brachial interior showing cardinalia,  $\times 3$ , hypotype, 110301c.

Elway formation, cut on east side of U. S. Highway 25W, 4.7 miles south of Clinton, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.

- (23) Pedicle interior showing pallial trunks,  $\times 2$ , hypotype, 110309a.

Elway formation, Speers Ferry, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

### PLATE 58

#### DINORTHIS

- A. *Dinorthis venusta* Cooper, new species..... 401  
 (1) Impression of the pedicle interior, prepared by burning shell,  $\times 1$ , paratype, 116978c; (2) exterior of the brachial valve,  $\times 1$ , paratype, 116978b; (3) exterior of the pedicle valve,  $\times 1$ , paratype, 116989a.  
 Red Knobs formation, near fault, 3 miles northwest of Madisonville, Tenn.
- B. *Dinorthis quadruplicata* Willard = *D. transversa* Willard..... 398  
 (4, 5) Respectively side and pedicle views of a complete specimen,  $\times 1$ , hypotype, 116976b; (6-10) respectively brachial, anterior, side, posterior, and pedicle views of a nearly perfect specimen,  $\times 1$ , hypotype, 116976a.  
 Benbolt formation, 0.2 mile south of the middle fork of Moccasin Creek,  $1\frac{1}{2}$  miles due south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.
- C. *Dinorthis transversa* Willard..... 398  
 (11-15) Respectively brachial, pedicle, side, anterior, and posterior views of a nearly perfect specimen,  $\times 1$ , hypotype, 116977; (17-21) respectively brachial, pedicle, side, anterior, and posterior views of another nearly perfect, large specimen,  $\times 1$ , hypotype, 111800a; (24) pedicle view of a smaller specimen,  $\times 1$ , hypotype, 111800b.  
 Benbolt formation, south side of Mount Hagan School, Hilton (T.V.A. 197-NW) Quadrangle, Va.  
 (16) Large pedicle valve,  $\times 1$ , hypotype, 116976c.  
 Horizon and locality same as preceding.  
 (22, 23) Pedicle and brachial views of a complete but imperfect specimen,  $\times 1$ , hypotype, 111799.  
 Shippensburg formation (Pinesburg member—*Echinospaerites* beds), cut on U. S. Highway 40, west side of Conococheague Creek, 7 miles west of Hagerstown, Williamsport (15') Quadrangle, Md.  
 (25, 26) Respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior, hypotype, 110370.  
 Dryden formation, 100 yards west of the store, junction of Tennessee Highway 33 and the Flint Creek road, Maynardville (T.V.A. 145-SE) Quadrangle, Tenn.  
 (27) Brachial interior,  $\times 2$ , hypotype, 116975.  
 Benbolt formation, at the brick church  $1\frac{1}{2}$  miles west-southwest of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

## PLATE 59

## DINORTHIS

- A. *Dinorthis willardi* Cooper, new species..... 402
- (1-5) Respectively posterior, anterior, pedicle, brachial, and side views of a complete specimen,  $\times 1$ , holotype, 116981c; (6, 7) pedicle and brachial views of a larger specimen,  $\times 1$ , paratype, 116981b; (8) pedicle view of a very large individual,  $\times 1$ , paratype, 116981a.
- Lincolnshire formation (Hogskin member), Sally Cleveland Farm,  $\frac{3}{4}$  mile southwest of Washburn, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.
- (9) Pedicle interior,  $\times 2$ , paratype, 116983b; (11) muscle area of same,  $\times 3$ , showing small pseudodeltidium; (16) posterior view,  $\times 3$ , of same, showing pseudodeltidium; (14, 15) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial interior, paratype, 116983c.
- Lincolnshire formation (Hogskin member), Evans Ferry section along U. S. Highway 25E,  $\frac{3}{4}$  mile north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.
- (10) Pedicle interior,  $\times 2$ , paratype, 116982a.
- Lincolnshire formation (Hogskin member), Evans Ferry section on U. S. Highway 25E,  $\frac{3}{4}$  mile north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.
- (12) Brachial interior of a large specimen, showing small cardinalia,  $\times 1$ , hypotype, 117988a; (13) same,  $\times 2$ .
- Lincolnshire formation (Hogskin member), 2 miles southwest of Hall Cross-road, in northwest  $\frac{1}{4}$  of center subquad., Fountain City (T.V.A. 146-SW), Quadrangle, Tenn.
- B. *Dinorthis virginienensis* Cooper, new species..... 402
- (17) Pedicle exterior,  $\times 1$ , paratype, 116980b; (18) pedicle interior,  $\times 1$ , paratype, 116980a.
- Edinburg formation (50 to 75 feet above the cherty beds of the Lincolnshire), quarry on the north side of U. S. Highway 33, 1 mile west of the junction with Virginia Highway 613, 4 miles west of Dale Enterprise, Harrisonburg (15') Quadrangle, Va.
- (19-21) Respectively pedicle, brachial, and side views,  $\times 1$ , of the exfoliated holotype, 116979.
- Edinburg formation (500 to 600 feet above Lincolnshire), along Colliers Creek on Virginia Highway 251,  $\frac{1}{2}$  mile north of its junction with Virginia Highway 612, 6 miles west-southwest of Lexington, Rockbridge County, Va.

## PLATE 60

## MULTICOSTELLA

- A. *Multicostella convexa* Cooper, new species..... 418
- (1-5) Respectively pedicle, brachial, posterior, anterior, and side views of a large specimen,  $\times 1$ , holotype, 110389a; (6-10) respectively pedicle, brachial, side, anterior, and posterior views of another nearly perfect individual,  $\times 1$ , paratype, 110386a; (11, 12) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior, showing pallial trunks, paratype, 110380a; (13) another pedicle interior,  $\times 1$ , paratype, 110385b; (14) pedicle interior with less well developed pallial trunks,  $\times 1$ , paratype, 110386b; (15) same,  $\times 2$ , showing details of pallial marks and muscle scars; (16) posterior half of the brachial interior showing accessory ridges beside cardinal process,  $\times 2$ , paratype, 110385d; (17, 18) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial valve showing cardinalia and pallial trunks,

paratype, 110380b; (19) brachial interior,  $\times 2$ , showing adductor field and cardinalia with a slight development of accessory cardinal process ridges, paratype, 110385c.

Bromide formation (Mountain Lake member—zone 5 of Decker), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

## PLATE 61

## CHAULISTOMELLA, DINORTHIS, MULTICOSTELLA

- A. *Multicostella convexa*, Cooper, new species..... 418  
 (1-5) Respectively pedicle, side, posterior, anterior, and brachial views of a well-preserved individual,  $\times 1$ , paratype, 116986a; (6) brachial interior,  $\times 1$ , paratype, 116986b.  
 Bromide formation (Mountain Lake member), top of green shale sequence, dam on Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.
- B. *Multicostella rectangulata* Cooper, new species..... 425  
 (7, 10) Respectively pedicle and brachial views of a medium-sized specimen,  $\times 1$ , paratype, 116990; (8, 9) respectively brachial and pedicle views of a small specimen,  $\times 1$ , paratype, 123456.  
 Yellow limestone on 25-foot sandstone at base of Eureka group, ridge 2 miles north of Martin Ranch, Roberts Mountains (1°) Quadrangle, Nev.
- C. *Multicostella parallela* Cooper, new species..... 420  
 (11-15) Respectively side, pedicle, posterior, anterior, and brachial views of a fully grown specimen,  $\times 1$ , holotype, 116989b.  
 Same horizon and locality as preceding.
- D. *Chaulistomella mira* Cooper, new species..... 439  
 (16-20) Respectively anterior, posterior, side, pedicle, and brachial views of a perfect specimen,  $\times 1$ , holotype, 117001a; (21) pedicle interior,  $\times 1$ , paratype, 117001c; (22) brachial interior,  $\times 1$ , paratype, 117001d.  
 Bromide formation (Mountain Lake member—cystid bed), first dam on Spring Creek, N $\frac{1}{2}$  sec. 17, T. 2 S., R. 1 W., Murray County, Okla.
- E. *Dinorthis transversoides* Cooper, new species..... 400  
 (23, 24) Respectively  $\times 1$  and  $\times 2$  enlargements of a brachial exterior, paratype, 110341c; (25, 26) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle exterior, holotype, 110341b; (27) another pedicle exterior,  $\times 1$ , paratype, 110341a; (28) another brachial exterior,  $\times 1$ , paratype, 110341d.  
 Dryden formation, 1 mile west of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.

## PLATE 62

## MULTICOSTELLA

- A. *Multicostella planosulcata* Cooper, new species..... 421  
 (1, 2, 4, 5) Respectively brachial, side, anterior, and pedicle views of a complete specimen,  $\times 1$ , holotype, 110423a.  
 Arline formation, 1 mile east-northeast of Friendsville, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.  
 (3) Pedicle interior,  $\times 1$ , paratype, 110412a.  
 Arline formation (middle part), north side of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- B. *Multicostella plena* Cooper, new species..... 422  
 (6-10) Respectively brachial, pedicle, posterior, side, and anterior views,  $\times 1$ , of

the holotype, 110403e; (11) brachial view,  $\times 2$ , of the holotype; (12) brachial interior preserving traces of the pallial marks,  $\times 2$ , paratype, 110403b; (13) another brachial interior showing the cardinalia exceptionally well,  $\times 2$ , paratype, 110403d; (14) pedicle interior showing pallial trunks,  $\times 2$ , paratype, 110403c.

Horizon and locality same as preceding.

- C. *Multicostella gerontica* Cooper, new species..... 419  
 (15, 17) Respectively exterior and interior of the brachial valve,  $\times 1$ , paratype, 110392c; (19) same,  $\times 2$ , showing details of cardinalia and pallial trunks; (16) exterior of the pedicle valve,  $\times 1$ , holotype, 110392f; (18) pedicle interior of an old specimen showing extravagant development of pallial marks,  $\times 1$ , paratype, 110392a; (20) pedicle interior,  $\times 2$ , of another specimen showing pallial trunks, paratype, 110392g.  
 Lincolnshire formation, Marble Bluff, 8 miles west-northwest of Loudon, Loudon (30') Quadrangle, Tenn.

### PLATE 63

#### CHAULISTOMELLA, MULTICOSTELLA

- A. *Chaulistomella* sp. 1..... 445  
 (1-5) Respectively brachial, pedicle, side, anterior, and posterior views of a complete specimen,  $\times 1$ , figured specimen, 117990a; (6, 7) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial interior, figured specimen, 117990b.  
 Carters formation (*Oxoplecia* bed), quarry 0.3 mile north of Gate City, Leeds (15') Quadrangle, Ala.
- B. *Multicostella robusta* Cooper, new species..... 426  
 (8-11) Respectively pedicle, anterior, brachial, and side views of a complete specimen,  $\times 1$ , holotype, 116992a; (12) enlargement,  $\times 3$ , of surface of same.  
 Sevier formation,  $\frac{1}{4}$  mile north of Gooseneck, southwest corner of Louisville (T.V.A. 138-SE) Quadrangle, Tenn.
- C. *Multicostella quadrata* Cooper, new species..... 424  
 (13, 14) Respectively brachial and pedicle views of a small individual,  $\times 1$ , paratype, 98189a; (20) pedicle interior showing large muscle area,  $\times 1$ , paratype, 98189c; (21) brachial interior,  $\times 2$ , paratype, 98189g.  
 Whistle Creek formation, on Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.  
 (15-19) Respectively pedicle, brachial, side, posterior, and anterior views,  $\times 1$ , of the holotype, 116989a.  
 Whistle Creek formation, on U. S. Highway 60, 100 yards southeast of Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.
- D. *Multicostella plicata* Cooper, new species..... 423  
 (22, 23) Respectively brachial and pedicle views of a large specimen,  $\times 1$ , paratype, 110425e; (24-26) respectively pedicle, brachial, and side views of a young specimen,  $\times 1$ , paratype, 110425b; (27) brachial interior,  $\times 1$ , holotype, 110414b; (28) pedicle interior belonging to preceding valve,  $\times 1$ , holotype, 110414c; (29) pedicle interior,  $\times 2$ , showing details of muscle area, paratype, 110414a.  
 Lincolnshire formation,  $\frac{1}{2}$  mile north of Eidson on old lane, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.

## PLATE 64

## CHAULISTOMELLA, MULTICOSTELLA

- |   | Page |
|---|------|
| A. <i>Chaulistomella ridleyensis</i> Cooper, new species.....   | 443  |
| (1-5) Respectively pedicle, posterior, side, anterior, and brachial views of a complete specimen, $\times 1$ , holotype, 117007.  |      |
| Ridley formation (lower third), Marshall Knobs, 5 miles south of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.   |      |
| B. <i>Multicostella rectangulata</i> Cooper, new species.....   | 425  |
| (6-9) Respectively pedicle, side, anterior, and brachial views of a complete but imperfect specimen, $\times 1$ , holotype, 116991.   |      |
| Yellow limestone above 25-foot sandstone at base of Eureka group, saddle just north of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.   |      |
| C. <i>Multicostella bursa</i> (Raymond).....  | 416  |
| (10) Pedicle interior, $\times 1$ , hypotype, 110371d; (11) brachial interior, $\times 1$ , hypotype, 110371b; (12) brachial exterior, $\times 1$ , hypotype, 110371a; (13) brachial exterior, $\times 1$ , hypotype, 110372b; (14) pedicle exterior, $\times 1$ , hypotype, 110372a; (15) pedicle exterior, $\times 1$ , hypotype, 110371e.  |      |
| Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Bland County, Va.   |      |
| (16) Brachial interior, $\times 1\frac{1}{2}$ , showing cardinalia and short median ridge, hypotype, 116984h.   |      |
| Chatham Hill formation, 1.2 miles S. 31° E. of Sharon Springs, Burkes Garden (15') Quadrangle, Va.  |      |
| D. <i>Multicostella semisulcata</i> Cooper, new species.....  | 427  |
| (21-23) Respectively side, pedicle, and posterior views of a complete specimen, $\times 1$ , holotype, 110474b; (24) brachial view, $\times 2$ , of the holotype; (17) brachial interior, $\times 1$ , paratype, 110474a; (18) posterior of preceding, $\times 2$ , showing cardinalia; (19, 20) respectively $\times 1$ and $\times 2$ enlargements of the brachial interior, showing thickened supports of brachiophores, paratype, 110474e; (25, 26) respectively $\times 1$ and $\times 2$ enlargements of the pedicle interior, paratype, 110474c. |      |
| Lincolnshire formation (Hogskin member), nearly north of Hayes' house along small road beside fence, east of U. S. Highway 25E, Evans Ferry section, north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.  |      |

## PLATE 65

## CHAULISTOMELLA, DINORTHIS

- |  |     |
|--|-----|
| A. <i>Chaulistomella inaequistriata</i> Cooper, new species.....   | 435 |
| (1-5) Respectively pedicle, side, brachial, anterior, and posterior views, $\times 1$ , of the paratype, 110519a; (6) pedicle view of a complete specimen, $\times 1$ , paratype, 110519f.   |     |
| Wardell formation, Lloyd Carter's barn, 0.8 mile by road northeast of school at Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.   |     |
| B. <i>Chaulistomella brevis</i> (Willard).....   | 433 |
| (7, 9-12) Respectively brachial, side, anterior, posterior, and pedicle views of a complete specimen, $\times 1$ , hypotype, 110462b; (8) brachial interior, $\times 1$ , hypotype, 110462d. |     |
| Benbolt formation (100 feet above <i>Echinospaerites</i> zone), on Virginia Highway 74, 5½ miles east of the junction with U. S. Highway 54, Hilton (T.V.A. 197-NW) Quadrangle, Va.          |     |

	Page
C. <i>Dinorthis sweetneyi</i> (N. H. Winchell).....	397
(13-17) Respectively anterior, side, brachial, posterior, and pedicle views of a complete individual showing divided and intercalated costae, $\times 1$ , figured specimen, 118020a.	
Decorah formation (Ion member), road cut 1.1 miles east of U. S. Highway 52, south side of Cannon Falls, Goodhue County, Minn.	
D. <i>Chaulistomella elongata</i> (Willard).....	435
(18) Brachial interior, $\times 1$ , hypotype, 110473b; (19, 20) respectively side and pedicle views of a complete specimen, $\times 1$ , hypotype, 110473a.	
Benbolt part of Dryden formation (300 feet above Stones River formation), 100 yards west of the store, junction of Tennessee Highway 33 and Flint Creek road, Maynardville (T.V.A. 145-SE) Quadrangle, Tenn.	
E. <i>Chaulistomella lebanonensis</i> Cooper, new species.....	437
(22, 24-27) Respectively side, brachial, posterior, anterior, and pedicle views, $\times 1$ , of the holotype, 84024a; (28) pedicle view, $\times 2$ , of holotype.	
Lebanon formation, Lebanon, Wilson County, Tenn.	
(29, 30) Respectively $\times 1$ and $\times 2$ enlargements of the brachial valve, paratype, 110524a.	
Lebanon formation, Columbia, Maury County, Tenn.	
(23) Pedicle interior, $\times 1$ , paratype, 110533a.	
Lebanon formation, on U. S. Highway 41, $\frac{3}{4}$ mile south of Knox Branch, 9 miles southeast of Murfreesboro, Rutherford County, Tenn.	
(21) Posterior of brachial interior showing cardinalia, $\times 2$ , paratype, 110523a.	
Lebanon formation, on U. S. Highway 70N, $\frac{1}{2}$ mile west of Rome, Smith County, Tenn.	

## PLATE 66

## CHAULISTOMELLA

A. <i>Chaulistomella superlata</i> Cooper, new species.....	444
(1-5) Respectively brachial, pedicle, anterior, posterior, and side views of a complete specimen, $\times 1$ , holotype, 110506a; (6) pedicle interior, $\times 1$ , paratype, 110506f; (7) brachial interior, $\times 1$ , paratype, 110506e; (8) pedicle exterior of a small complete specimen, $\times 1$ , paratype, 110506b; (9) another pedicle interior, $\times 1$ , paratype, 110506d.	
Ridley formation, cut on U. S. Highway 27, just northwest of Chickamauga Creek, Kensington (T.V.A. 106-SE) Quadrangle, Ga.	
B. <i>Chaulistomella brevis</i> (Willard).....	433
(10-14) Respectively posterior, anterior, side, brachial, and pedicle views of a large complete specimen, $\times 1$ , hypotype, 116995a; (19) enlargement of surface, $\times 2$ , of pedicle valve of same hypotype.	
Upper Benbolt formation, 0.1 to 0.2 mile north of the road, 1.1 miles northeast of Lee Valley, Lee Valley (T.V.A. 171-NW) Quadrangle, Tenn.	
(15-18) Respectively brachial, anterior, side, and pedicle views of another complete and somewhat alate specimen, $\times 1$ , hypotype, 116994a.	
Benbolt formation, south side of Mount Hagan School, Hilton (T.V.A. 197-NW) Quadrangle, Va.	
C. <i>Chaulistomella brevis</i> (Willard).....	433
(20-23) Respectively brachial, pedicle, side, and anterior views of a complete specimen, $\times 1$ , somewhat narrower and slightly more coarsely costellate, hypotype, 116994e; (24) pedicle interior, $\times 1$ , hypotype, 116994b; (25) another pedicle interior, $\times 1$ , hypotype, 116994d; (26, 27) respectively $\times 1$ and $\times 2$ enlargements of the brachial interior, hypotype, 116994c.	
Horizon and locality same as preceding.	

## PLATE 67

## CHAULISTOMELLA

- |  | Page |
|--|------|
| A. <i>Chaulistomella ridleyensis</i> Cooper, new species.....  | 443  |
| (1-5) Respectively pedicle, anterior, brachial, posterior, and side views of a complete specimen, $\times 1$ , paratype, 117008a; (6) interior of a large pedicle valve showing muscle scars, $\times 1$ , paratype, 117008f; (7) interior of the brachial valve, $\times 1$ , paratype, 117008b.            |      |
| Ridley formation (lower 20 feet), Marshall Knobs, 5 miles south of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.  |      |
| B. <i>Chaulistomella obesa</i> Cooper, new species.....  | 441  |
| (9-13) Respectively side, brachial, posterior, anterior, and pedicle views of a complete specimen, $\times 1$ , paratype, 110561a.   |      |
| Bromide formation (Mountain Lake member), West Spring Creek section, east of Pooleville, Murray County, Okla.  |      |
| (8) Exterior of a large specimen seen in pedicle view, $\times 1$ , paratype, 117991a; (14-16) respectively side, brachial, and pedicle views of a specimen with details of the ornamentation well preserved, $\times 1$ , holotype, 110562a.  |      |
| Bromide formation (Mountain Lake member), sec. 25, T. 2 S., R. 1 E., $\frac{3}{4}$ mile west of U. S. Highway 77, Carter County, Okla.   |      |
| C. <i>Chaulistomella nitens</i> Cooper, new species.....   | 441  |
| (17-21) Respectively anterior, side, posterior, brachial, and pedicle views, $\times 1$ , of the holotype, 117003a; (22) interior of the brachial valve, $\times 1$ , paratype, 117003c; (23) cardinalia of the preceding enlarged, $\times 2$ , to show details. Note accessory tooth on outside of socket. |      |
| Bromide formation (Mountain Lake member), road cut on the east side of Oklahoma Highway 18, 1.8 miles south of Sulphur, Murray County, Okla.   |      |
| D. <i>Chaulistomella mundula</i> Cooper, new species.....  | 440  |
| (24-28) Respectively posterior, anterior, side, pedicle, and brachial views of a complete specimen, $\times 1$ , holotype, 117000a; (29) interior of the pedicle valve, $\times 2$ , showing details of the muscle and pallial marks, paratype, 117000e.   |      |
| Horizon and locality same as preceding.  |      |

## PLATE 68

## CAMPYLORTHIS, CHAULISTOMELLA, MULTICOSTELLA

- |   |     |
|---|-----|
| A. <i>Multicostella platys</i> (Billings).....  | 421 |
| (1-3) Pedicle, side and brachial views of the holotype, $\times 1$ , G.S.C. 1034.   |     |
| St. Martin formation, Island of Montreal, Quebec, Canada.   |     |
| (4) Brachial interior, $\times 2$ , hypotype, Carnegie Mus. 5467.   |     |
| Crown Point formation, near Fair Grounds, Plattsburg, Plattsburg (15') Quadrangle, N. Y.  |     |
| B. <i>Campylorthis subplana</i> Ulrich and Cooper.....  | 431 |
| (5, 6, 8, 11) Respectively pedicle, pedicle tilted to show interarea, brachial, and side views of a complete individual, $\times 1$ , holotype, 108199a; (12) posterior view of preceding, $\times 1\frac{1}{2}$ , showing pseudodeltidium and chilidium; (7) pedicle interior, $\times 1$ , paratype, 108199c; (9) brachial interior, $\times 1$ , paratype, 108199b; (10) posterior of brachial interior, $\times 2$ , showing cardinalia in detail, paratype, 108199d. |     |
| Barnhart formation, on old road, 1 mile northwest of Chicago Summer School Camp, NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 32, T. 37 N., R. 9 E., Weingarten (15') Quadrangle, Mo.   |     |
| C. <i>Chaulistomella inaequistriata</i> Cooper, new species.....  | 435 |
| (15-17, 19, 20) Respectively pedicle, side posterior, anterior, and brachial views of a complete specimen, $\times 1$ , holotype, 98212a; (13, 18) respectively $\times 1$ and $\times 2$   |     |



enlargements of the pedicle interior, showing muscle area and accessory articulating ridges on the cardinal extremities, paratype, 98212g; (14) posterior portion of the brachial interior showing cardinalia,  $\times 2$ , paratype, 110484b.

Wardell formation, Lloyd Carter's barn, 0.8 mile by road northeast of Rye Cove School, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

## PLATE 69

## CAMPYLORTHIS, CHAULISTOMELLA

- A. *Campylorthis deflecta* (Conrad)..... 430  
 (1) Posterior view showing pseudodeltidium and chilidium,  $\times 2$ , hypotype, 36101a; (2-6) respectively posterior, anterior, brachial, side, and pedicle views,  $\times 1$ , of the preceding specimen.  
 Platteville formation, Highland, Iowa County, Wis.
- B. *Chaulistomella rectangulata* Cooper, new species..... 442  
 (7-11) Respectively side, posterior, brachial, pedicle, and anterior views of a complete specimen,  $\times 1$ , paratype, 117005a.  
 Wardell formation (*Hesperorthis-Camerella* beds), road cut on U. S. Highway 25E,  $\frac{1}{2}$  mile north of Indian Creek, Evans Ferry section, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.  
 (12-16) Respectively posterior, side, pedicle, anterior, and brachial views of a complete specimen,  $\times 1$ , holotype, 117006.  
 Wardell formation (just above *Hesperorthis* bed), same locality as preceding.
- C. *Chaulistomella inaequistriata* Cooper, new species..... 435  
 (17-21) Respectively brachial, posterior, anterior, side, and pedicle views of a complete specimen,  $\times 1$ , paratype, 116997b.  
 Wardell formation (20 feet below the top), on U. S. Highway 58,  $\frac{1}{4}$  mile west of Danboone Yard, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- D. *Chaulistomella inaequistriata* Cooper, new species..... 435  
 (22) Pedicle interior,  $\times 2$ , showing muscle area, pedicle callist, and articulating ridges on cardinal extremity, paratype, 98212f.  
 Wardell formation, Lloyd Carter's barn, 0.8 mile by road northeast of Brick School at Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- E. *Chaulistomella lebanonensis* Cooper, new species..... 437  
 (23) Brachial interior,  $\times 2$ , showing unusual development of pallial trunks, paratype, 110534a.  
 Lebanon formation, cut on U. S. Highway 41,  $\frac{3}{4}$  mile south of Knox Branch, 9 miles southeast of Murfreesboro, Tenn.

## PLATE 70

## CHAULISTOMELLA, VALCOUREA

- A. *Valcourea semicarinata* Cooper, new species..... 410  
 (1, 2) Pedicle and brachial exteriors,  $\times 1$ , paratype, 98179; (3) pedicle exterior,  $\times 1$ , of the holotype, 110228d; (6) posterior showing cardinal process,  $\times 1$ , holotype; (8, 9) pedicle and brachial exteriors,  $\times 2$ , of the holotype; (4, 10) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior, showing form of muscle scar, paratype, 110228e; (5) interior of an imperfect brachial valve,  $\times 2$ , paratype, 110228g; (7) posterior view of the preceding,  $\times 3$ , showing carinate myophore of cardinal process.  
 Arline formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.

- |  | Page |
|--|------|
| B. <i>Chaulistomella magna</i> (Schuchert and Cooper).....   | 438  |
| (11, 12, 16, 17, 22) Respectively brachial, pedicle, posterior, anterior, and side views of a fine, complete specimen, $\times 1$ , hypotype, 110539c; (23) exterior, $\times 2$ , of preceding; (13, 14, 18, 19, 20) respectively brachial, pedicle, posterior, anterior, and side views of another complete specimen, $\times 1$ , hypotype, 110545; (15) brachial interior, $\times 1$ , paratype, 116999b; (21) pedicle interior, $\times 1\frac{1}{2}$ , showing superb development of pallial trunks, paratype, 110543a. |      |
| Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.  |      |
| PLATE 71   |      |
| CAMERELLA, CHAULISTOMELLA, DINORTHIS, MULTICOSTELLA, PLECTORTHIS, VALCOUREA  |      |
| A. <i>Multicostella sulcata</i> Cooper, new species.....   | 428  |
| (1-3) Respectively pedicle, side, and brachial views of an incomplete specimen showing the strong fold and sulcus, $\times 1$ , holotype, 116993.  |      |
| Bromide formation (Mountain Lake member— <i>Valcourea transversa</i> bed), on Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.  |      |
| (4) Another imperfect pedicle exterior, $\times 1$ , paratype, 110459.   |      |
| Bromide formation (Mountain Lake member), NE. corner sec. 1, T. 2 S., R. 2 W., 3 miles east of Pooleville, Murray County, Okla.  |      |
| B. <i>Chaulistomella crassa</i> Cooper, new species.....   | 434  |
| (5-9) Respectively posterior, anterior, side, brachial, and pedicle views, $\times 1$ , of the holotype, 116996a; (9a) interior of the pedicle valve, $\times 1$ , paratype, 116996b.  |      |
| Bromide formation (Mountain Lake member—just above bryozoan bed or <i>Mimella</i> zone), on Oklahoma Highway 99, 3 miles south of Fittstown, Pontotoc County, Okla.  |      |
| C. <i>Valcourea ventrocarinata</i> (Butts).....  | 414  |
| (10-14) Respectively posterior, anterior, side, pedicle, and brachial views of a complete, nearly perfect specimen, $\times 1$ , hypotype, 117992a.  |      |
| Little Oak formation, junction of Bailey Gap and Cahaba Valley roads, 1 $\frac{3}{4}$ miles northeast of Newhope Church, SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 19 S., R. 2 W., Vandiver (15') Quadrangle, Ala.   |      |
| D. <i>Multicostella fasciculata</i> (Butts).....   | 418  |
| (15-19) Respectively anterior, posterior, brachial, pedicle, and side views of a nearly complete specimen, $\times 1$ , hypotype, 116987; (20) brachial view of same, $\times 2$ , showing ornamentation.  |      |
| Horizon and locality same as preceding.  |      |
| E. <i>Plectorthis australis</i> Cooper, new species.....   | 447  |
| (21-25) Respectively pedicle, side, anterior, posterior, and brachial views, $\times 1$ , of the holotype, a complete specimen, 117019a; (26) brachial view, $\times 2$ , of the holotype, showing the ribbing in detail.  |      |
| Little Oak formation, road cut on U. S. Highway 31, $\frac{1}{2}$ mile north of Pelham, Bessemer Iron District (15') Quadrangle, Ala.  |      |
| F. <i>Camerella oklahomensis</i> Cooper, new species.....  | 574  |
| (27-31) Respectively posterior, brachial, pedicle, anterior, and side views, $\times 1$ , of the holotype, 117993; (32-35) respectively side, anterior, brachial, and pedicle views, $\times 2$ , of the holotype.   |      |
| Bromide formation (Pooleville member—50 feet below the top), 0.1 mile southeast of Observation Point on the Scenic Road to Falls Creek, about 1 mile southeast of U. S. Highway 77, Murray County, Okla.   |      |

- |  | Page |
|--|------|
| G. <i>Multicostella semisulcata</i> Cooper, new species.....   | 427  |
| (36-40) Respectively posterior, side, anterior, pedicle, and brachial views of a large specimen, $\times 1$ , paratype, 110433.<br>Lincolnshire formation (Hogskin member), 0.4 mile northeast of Red Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.   |      |
| H. <i>Dinorthis venusta</i> Cooper, new species.....   | 401  |
| (41-45) Respectively posterior, anterior, side, brachial, and pedicle views of a small but perfect specimen, $\times 1$ , paratype, 110286b; (46-50) respectively brachial, posterior, side, anterior, and pedicle views of a large and perfect specimen, $\times 1$ , holotype, 110286a.<br>Red Knobs formation, 2 miles southeast of Kiser, Meadow (T.V.A. 139-NW) Quadrangle, Tenn. |      |

## PLATE 72

## CHAULISTOMELLA, DINORTHIS, VALCOUREA

- |  |     |
|--|-----|
| A. <i>Dinorthis tenuis</i> Cooper, new species.....  | 397 |
| (1-5) Respectively brachial, posterior, anterior, pedicle and side views of a nearly complete specimen, $\times 1$ , holotype, 116974.<br>Sevier formation, east side of the road 2.7 miles S. 7° W. of Athens, Athens (T.V.A. 125-NE) Quadrangle, Tenn.   |     |
| B. <i>Chaulistomella inaequistriata</i> Cooper, new species.....   | 435 |
| (6-10) Respectively pedicle, posterior, anterior, brachial, and side views, $\times 1$ , of a paratype, 110488a; (11) pedicle interior, $\times 1$ , paratype, 110488b.<br>Dryden formation, Lone Mountain to Tazewell road, 1½ miles northeast of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.<br>(12, 13) Respectively $\times 1$ and $\times 2$ views of the brachial interior, paratype, 116998a.<br>Dryden formation, road along Little Sycamore Creek, 0.35 mile northeast of Halls School, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.  |     |
| C. <i>Valcourea plana</i> Cooper, new species.....   | 409 |
| (14-18) Respectively pedicle, posterior, anterior, side, and brachial views of a complete specimen, $\times 1$ , holotype, 116967.<br>Yellow limestone on 25-foot sandstone at base of Eureka group, 2 miles north of Martin Ranch, Roberts Mountains (1°) Quadrangle, Nev.<br>(19) Brachial view of an alate specimen, $\times 1$ , paratype, 116968a; (20, 21) respectively $\times 1$ and $\times 2$ enlargements of a partially exfoliated specimen showing part of the pallial trunk system, paratype, 116968b.<br>Same as preceding but 3 miles north of Martin Ranch.   |     |
| D. <i>Valcourea transversa</i> Cooper, new species.....  | 413 |
| (22-26) Respectively pedicle, brachial, posterior, anterior, and side views of a complete specimen, $\times 1$ , holotype, 116971.<br>Bromide formation (Mountain Lake member—49 to 66 feet above the basal sand), Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.<br>(29, 30) Interior and posterior views of a brachial valve showing muscle area and pseudodeltidium, $\times 2$ , paratype, 116972d; (28) exterior, $\times 2$ , of preceding; (31) same, $\times 4$ , showing ornamentation in detail; (27) brachial interior, $\times 2$ , showing cardinalia and pallial trunks, paratype, 116972b.<br>Bromide formation (Mountain Lake member— <i>Valcourea</i> bed in shale above calcarenite) at base of section, on Oklahoma Highway 99, 3 miles south of Fittstown, Pontotoc County, Okla. |     |

## PLATE 73

## VALCOUREA

- |   | Page |
|---|------|
| A. <i>Valcourea intracarinata</i> Ulrich and Cooper.....  | 408  |
| (1) Plasticine replica of the brachial exterior, $\times 2$ , paratype, 92852d; (2, 3) respectively the plasticine replica of the brachial interior and the impression from which it was prepared, $\times 2$ , paratype, 92852g; (4) plasticine replica of the brachial exterior, $\times 2$ , holotype, 92852f. |      |
| Upper Pogonip group ( <i>Valcourea</i> zone), Ikes Canyon, east side Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.   |      |
| B. <i>Valcourea ventrocarinata</i> (Butts).....   | 414  |
| (5, 6) Pedicle and brachial views, $\times 2$ , of the lectotype, 71498a.   |      |
| Little Oak formation, $\frac{1}{2}$ mile north of Pelham, Bessemer Iron District (15') Quadrangle, Ala.   |      |
| (7, 8) Brachial and pedicle views of a complete specimen, $\times 1$ , hypotype, 110246; (9, 10) brachial and pedicle views of another complete specimen, $\times 1$ , hypotype, 117992a; (11-14) respectively pedicle, brachial, posterior, and side views, $\times 2$ , of the preceding.                       |      |
| Little Oak formation, junction of main road and Bailey Gap road, SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 19 S., R. 2 W., 1 $\frac{3}{4}$ miles northeast of Newhope Church, Vandiver (15') Quadrangle, Ala.   |      |
| C. <i>Valcourea plana</i> Cooper, new species.....  | 409  |
| (15) Impression of the interior of a pedicle valve, $\times 1$ , paratype, 110265a; (16-19) respectively brachial, pedicle, side, and posterior views, $\times 2$ , of the preceding specimen; (20) poorly preserved pedicle exterior, $\times 2$ , paratype, 110265c.  |      |
| Yellow limestone above 25-foot sandstone, crest of Antelope Range, 3 miles south of Ninemile Canyon, Roberts Mountains (1°) Quadrangle, Nev.  |      |
| (21) Exterior of an imperfect pedicle valve, $\times 1$ , paratype, 117994a; (22) same, $\times 3$ , showing some details of the ornamentation.   |      |
| Same formation as preceding, saddle just north of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.  |      |
| D. <i>Valcourea</i> sp. 2.....  | 415  |
| (23, 24) Respectively $\times 1$ and $\times 2$ enlargements of the pedicle interior, figured specimen, 110257; (25) exterior, $\times 1$ , of the same specimen.   |      |
| Lincolnshire formation, Marble Bluff, 8 miles west-northwest of Loudon, Loudon (30') Quadrangle, Tenn.  |      |
| E. <i>Valcourea</i> sp. 1.....  | 415  |
| (26, 27) Pedicle and brachial views of a nearly complete specimen, $\times 1$ , figured specimen, 110203a.  |      |
| Lincolnshire formation, Marcem Quarry, 2 miles west of Gate City, Gate City (T.V.A. 188-NE) Quadrangle, Va.   |      |

## PLATE 74

## VALCOUREA

- |  |     |
|--|-----|
| A. <i>Valcourea deckeri</i> Cooper, new species.....   | 407 |
| (1) Pedicle interior, $\times 1$ , paratype, 110211c; (2, 3, 11, 13) respectively brachial, pedicle, posterior, and side views, $\times 1$ , of the holotype, 110208a; (6) posterior view, $\times 2$ , of holotype; (4) brachial exterior, $\times 1$ , paratype, 110212a; (5) another pedicle interior, $\times 1$ , paratype, 110212b; (7) brachial exterior of a wide-hinged specimen, $\times 1$ , paratype, 110208c; (8, 12) brachial interior showing pallial trunks, $\times 1$ and $\times 2$ , paratype, 110211b; (9) pedicle interior of a small, wide-hinged form, $\times 1$ , paratype, 110208e; (10) brachial interior in posterior |     |

view showing myophore of cardinal process,  $\times 1$ , paratype, 110208b; (14) same,  $\times 3$ , showing carinate myophore.

Tulip Creek formation (top),  $SE\frac{1}{4}SW\frac{1}{4}$  sec. 22, T. 2 S., R. 3 E., on west slope of hill in road ditch,  $1\frac{1}{2}$  miles west of Nebo, Murray County, Okla.

B. *Valcourea strophomenoides* (Raymond)..... 411

(17, 22) Side and brachial views of a complete specimen,  $\times 1$ , holotype, Carnegie Mus. 5450; (15) brachial view,  $\times 2$ , of same.

Crown Point formation, Plattsburg, Plattsburg (15') Quadrangle, N. Y.

(16) Pedicle interior,  $\times 1$ , paratype, Carnegie Mus. 5467; (19) posterior of same specimen,  $\times 2$ , showing muscle area; (18, 21, 20) respectively brachial, pedicle, and posterior views of a nearly perfect specimen,  $\times 2$ , paratype, Carnegie Mus. 5492; (25) part of pedicle valve,  $\times 4$ , of preceding specimen; (23) pedicle interior,  $\times 3$ , paratype, Carnegie Mus. 5466; (24) pedicle exterior showing fold,  $\times 2$ , paratype, Carnegie Mus. 5467 (on same piece as specimen represented by fig. 16).

Crown Point formation, near the Fair Grounds, Plattsburg, Plattsburg (15') Quadrangle, N. Y.

PLATE 75

VALCOUREA

A. *Valcourea brevicarinata* Cooper, new species..... 406

(1) Pedicle interior,  $\times 2$ , paratype, 110248a; (3) exterior,  $\times 1$ , of the preceding; (2) brachial interior,  $\times 2$ , paratype, 110248b; (4, 5) respectively  $\times 1$  and  $\times 2$  enlargement of the brachial valve of a complete specimen, holotype, 110248c.

Upper Arline formation, on north side of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

B. *Valcourea austrina* Cooper, new species..... 405

(6-9) Respectively brachial, pedicle, side, and anterior views of a complete specimen,  $\times 1$ , holotype, 98177a; (10-12) respectively pedicle, posterior, and brachial views,  $\times 2$ , of the holotype; (13-15) brachial, pedicle, and side views of a complete specimen,  $\times 1$ , paratype, 110195a; (16, 17) posterior and pedicle views,  $\times 2$ , of the preceding; (25) pedicle interior,  $\times 2$ , paratype, 98177b; (26) pedicle interior,  $\times 2$ , paratype, 98177d; (27) interior of brachial valve showing cardinalia,  $\times 3$ , paratype, 98177e.

Whistle Creek formation, on Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.

(18-22) Respectively pedicle, brachial, anterior, posterior, and side views of a large and obese specimen,  $\times 1$ , paratype, 116965b; (23, 24) respectively  $\times 2$  and  $\times 1$  views of a pedicle interior, paratype, 116965a.

Whistle Creek formation, on U. S. Highway 60, 100 yards southeast of Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.

PLATE 76

CHAULISTOMELLA, VALCOUREA

A. *Valcourea obscura* Cooper, new species..... 409

(1, 2) Respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior, paratype, 116966; (3, 7) pedicle and posterior views of a complete specimen,  $\times 1$ , holotype, 110254e; (4, 5) same view,  $\times 2$ ; (6, 8, 9) respectively pedicle, side, and brachial views of a specimen younger than the preceding,  $\times 1$ , paratype, 110254d; (10) brachial view,  $\times 2$ , of the same specimen.

- |   | Page |
|---|------|
| Lenoir formation, small quarry between the Southern RR. tracks and U. S. Highway 11, 1½ miles southwest of Philadelphia, Philadelphia (T.V.A. 131-NW) Quadrangle, Tenn.   |      |
| B. <i>Valcourea transversa</i> Cooper, new species.....   | 413  |
| (11-13) Respectively brachial, pedicle, and posterior views of a complete specimen, × 1, paratype, 110277b; (14) pedicle view of same, × 2, showing ornamentation. Bromide formation (Mountain Lake member—small <i>Valcourea</i> bed), along U. S. Highway 77, NE¼ sec. 25, T. 2 S., R. 1 E., Carter County, Okla.   |      |
| C. <i>Chaulistomella mundula</i> Cooper, new species.....   | 440  |
| (15) Brachial interior, × 1, paratype, 110442a; (16, 17) interior and exterior of the pedicle valve, × 1, paratype, 110442b. Bromide formation (Mountain Lake member), deep well on Jones Farm, sec. 22, T. 5 N., R. 3 E., Midcontinent Petroleum Corporation, Pottawatomie County, Okla.   |      |
| D. <i>Valcourea tenuis</i> Cooper, new species.....   | 412  |
| (18, 19) Brachial and pedicle views of a young alate specimen, × 2, paratype, 116970a; (22, 23, 26) respectively × 2 and × 1 enlargements of pedicle exterior and interior, paratype, 116970b; (28) brachial interior, × 4, paratype, 116970i; (24) brachial interior, × 3, paratype, 116970d; (20, 21) brachial and pedicle views, × 3, holotype, 116970e; (25) pedicle interior showing muscle area, × 2, paratype, 116970j; (27) small pedicle interior, × 3, paratype, 116970f; (29) brachial interior of a broken specimen, × 3, showing cardinalia, paratype, 116970g. Tulip Creek formation (152 feet above basal sand), in first creek east of U. S. Highway 77, SE¼NE¼ sec. 25, T. 2 S., R. 1 E., Carter County, Okla. |      |

## PLATE 77

## EREMOTOECHIA, TRITOECHIA

- |  |     |
|--|-----|
| A. <i>Tritoecchia typica</i> (Ulrich).....   | 512 |
| (1) Pedicle interior tipped to show dental plates, × 1, hypotype, 92985c; (7) normal interior view, × 1, of same; (2) brachial interior of an old specimen, showing internal thickenings, × 2, hypotype, 92985j; (3) brachial interior of a fully grown specimen, × 1, hypotype, 92985i; (5, 8) posterior and exterior views of the pedicle valve, × 1, hypotype, 92985b. Kindblade formation, 6 miles west-northwest of Ravia, Johnston County, Okla. (4) Brachial exterior, × 2, showing swollen costellae, hypotype, 91750d; (6) posterior view of pedicle valve showing finely costellate interarea, × 2, hypotype, 91750k; (9) brachial interior of a normal specimen showing median ridge and cardinalia, × 2, hypotype, 91750g. Kindblade formation, 7 miles northeast of Berwyn, SE. corner sec: 6, T. 3 S., R. 4 E., Johnston County, Okla. |     |
| B. <i>Eremotoecchia claudi</i> Cooper, new species.....  | 514 |
| (10-14) Respectively brachial, pedicle, side, posterior, and anterior views of a somewhat exfoliated specimen, × 1, paratype, 117062; (15) posterior view, × 2, showing pseudodeltidium, of the same specimen. Arline formation (near middle), 1 mile southeast of Fowlers Mill, 10 miles southeast of Loudon, Tenn.   |     |
| C. <i>Eremotoecchia claudi</i> Cooper, new species.....  | 514 |
| (16-20) Respectively anterior, posterior, pedicle, brachial, and side views, × 1, of the holotype, 117061a; (21) pedicle interior, × 1, of the holotype; (22) same, × 2, tilted to show dental plates; (23) brachial interior of holotype, × 2, showing peculiar cardinalia, somewhat reminiscent of <i>Tritoecchia</i> above; (24) bra-   |     |

chial interior of holotype,  $\times 2$ , tilted to show cardinal process, chilidial cavity, and cuplike brachiophores; (27) another brachial interior,  $\times 1$ , paratype, 117061b; (25, 26) the same specimen in normal and tilted positions,  $\times 2$ , to show the cardinalia.

Arline formation (near middle), north side of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

## PLATE 78

## ANOMALORTHIS, ATELELASMA, EREMOTOECHIA

- A. *Eremotoechia alabamensis* Cooper, new species..... 514  
 (1-4) Respectively posterior, side, pedicle, and brachial views of an imperfect specimen showing apical foramen and pseudodeltidium,  $\times 1$ , holotype, 117060b; (9) posterior view of the holotype,  $\times 2$ , showing pseudodeltidium; (5-8) respectively brachial, pedicle, side, and anterior views of another nearly complete specimen,  $\times 1$ , paratype, 117060a.  
 Little Oak formation, cut on U. S. Highway 31,  $\frac{1}{2}$  mile north of the bridge at Pelham, Bessemer Iron District (15') Quadrangle, Ala.
- B. *Anomalorthis nevadensis* Ulrich and Cooper..... 392  
 (10-12) Exterior, side, and interior views of the pedicle valve,  $\times 2$ , holotype, 92853c.  
 Upper Pogonip group (*Anomalorthis* zone), west base of Lone Mountain, 18 miles northwest of Eureka, Roberts Mountains (1°) Quadrangle, Nev.
- C. *Anomalorthis oklahomensis* Ulrich and Cooper..... 392  
 (13) Brachial exterior,  $\times 2$ , paratype, 92854b; (14-16) respectively exterior, tilted, and side views of the pedicle valve,  $\times 2$ , lectotype, 92854a.  
 Oil Creek formation, NE $\frac{1}{4}$  sec. 22, T. 2 S., R. 1 E., 4 to 5 miles north of Glenn, Carter County, Okla.  
 (17, 18) Brachial impression and the plasticine replica prepared from it,  $\times 1$ , paratype, 110182.  
 Oil Creek formation, Henryhouse Creek, Carter County, Okla.  
 (19, 20) Pedicle interior, tilted and in standard view to show dental plates and muscle area,  $\times 2$ , paratype, 92855.  
 Oil Creek formation (125 feet below the top), U. S. Highway 77, sec. 25, T. 2 S., R. 1 E., Carter County, Okla.
- D. *Atelelasma obscurum* Cooper, new species..... 520  
 (21) Pedicle exterior,  $\times 1$ , holotype, 117012d; (26) posterior of the holotype,  $\times 2$ , showing lateral plates; (22) brachial exterior,  $\times 1$ , paratype, 117012a; (23, 24) exterior and side views of another pedicle valve,  $\times 1$ , paratype, 117012e; (27) posterior view,  $\times 2$ , of preceding; (25) exterior of another brachial valve,  $\times 2$ , paratype, 117012b; (28, 29) interior and posterior views of the brachial interior showing cardinalia and chilidium,  $\times 2$ , paratype, 117012f; (30) another brachial interior,  $\times 2$ , paratype, 117012i; (31) brachial interior showing cardinalia with brachial processes,  $\times 2$ , paratype, 117012c.  
 Lincolnshire formation (Hogskin member), 0.4 mile east-northeast of Red Hill, 4 miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.

## PLATE 79

## ATELELASMA

- A. *Atelelasma decorticatum* Cooper, new species..... 518  
 (1, 2) Side and exterior of an exfoliated pedicle valve,  $\times 1$ , holotype, 11012a.  
 Murat formation, Murat, Natural Bridge (15') Quadrangle, Va.

- B. *Atelelasma* aff. *A. perfectum* Cooper, new species..... 522  
 (3) Impression of a pedicle interior doubtfully referred to this species,  $\times 1$ , figured specimen, 110132a.  
 Whistle Creek formation, top of the ridge 1,000 feet north of the road on Buffalo Creek,  $2\frac{1}{2}$  miles west of Murat, Natural Bridge (15') Quadrangle, Va.
- C. *Atelelasma perfectum* Cooper, new species..... 522  
 (4, 5) Two pedicle interiors,  $\times 1$ , paratypes, 110135p, 110135k; (6-8, 11) respectively pedicle, brachial, side, and posterior views of a complete specimen,  $\times 1$ , holotype, 110135g; (9, 10) pedicle and brachial interiors,  $\times 1$ , of the holotype; (12, 14, 16) respectively side, pedicle, and brachial views of a large, somewhat laterally compressed specimen,  $\times 1$ , paratype, 110135i; (13, 15) brachial and pedicle interiors,  $\times 1$ , of the preceding; (17, 18) exterior and interior of a large pedicle valve,  $\times 1$ , paratype, 110135h; (19) brachial view,  $\times 1$ , of the preceding specimen with both valves in contact; (20) fine brachial interior,  $\times 2$ , showing pallial trunks and cardinalia, paratype, 110135j; (21) small brachial interior,  $\times 2$ , paratype, 110135n; (22) posterior of the pedicle interior and interarea showing lateral plates bounding the delthyrium,  $\times 2$ , paratype, 110135f; (23) small brachial valve,  $\times 3$ , showing brachiophores and their supporting tissue, paratype, 110135-l; (24) exterior of a fine individual showing lateral plates,  $\times 1$ , paratype, 110136; (25) fine pedicle interior,  $\times 2$ , showing pallial trunks, paratype, 110135d.  
 Arline formation (near middle), north side of old road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

## PLATE 80

## ATELELASMA, KULLERVO

- A. *Kullervo ornata* Cooper, new species..... 527  
 (1, 6) Exterior and interior of the brachial valve,  $\times 4$ , paratype, 110150b; (2-5) respectively posterior, interior, apical, and exterior views of the pedicle valve,  $\times 4$ , holotype, 110150a. Fig. 2 shows the lateral plates in the spondylium.  
 Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- B. *Kullervo parva* Cooper, new species..... 527  
 (7, 8) Two views of the interior of an imperfect pedicle valve, showing spondylium,  $\times 4$ , paratype, 110148b; (9) brachial interior,  $\times 3$ , showing cardinalia, holotype, 110148a; (10, 11) interior and exterior of a fine brachial valve,  $\times 4$ , paratype, 110149.  
 Horizon and locality same as preceding.
- C. *Atelelasma oklahomense* Cooper, new species..... 521  
 (12, 13) Respectively  $\times 2$  and  $\times 1$  enlargements of the posterior of the pedicle valve showing lateral plates along the delthyrial edge, holotype, 110124; (15, 16) side and exterior views,  $\times 1$ , of the preceding specimen.  
 Bromide formation (Mountain Lake member—near top in *Multicostella convexa* zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.  
 (14) Pedicle interior,  $\times 1$ , paratype, 110125; (17, 18) posterior and interior views,  $\times 2$ , of the paratype, showing lateral plates along the delthyrial edge; (19) exterior,  $\times 2$ , of the paratype.  
 Bromide formation (Mountain Lake member—bed 16 of Decker), west branch of Sycamore Creek, sec. 22 and 27, T. 3 S., R. 4 E., 7 miles northwest of Ravia, Johnston County, Okla.



	Page
D. <i>Atelelasma planum</i> Cooper, new species.....	523
(20) Posterior view showing large delthyrium, $\times 1$ , holotype, 110142b; (24) brachial view, $\times 1$ , of the preceding; (21, 22) side and brachial views of a specimen from which the beak has been rubbed away, $\times 1$ , paratype, 110142a; (23) brachial exterior, $\times 2$ , of the preceding.	
Benbolt formation (?), 1½ miles southeast of Knoxville, Knoxville (T.V.A. 147-NW) Quadrangle, Tenn.	
E. <i>Atelelasma</i> sp. 1.....	526
(25) Pedicle interior, $\times 1$ , figured specimen, 110141.	
Little Oak formation, ½ mile east of Cobb City = Cobb, Glencoe (7½') Quadrangle, Ala.	
F. <i>Atelelasma</i> ? <i>multicostum</i> (Hudson).....	520
(26) Brachial interior, $\times 2$ , showing cardinalia and deeply impressed, large adductor scars, hypotype, 110117d; (27, 30, 33) respectively apical, side, and brachial views of a complete specimen, $\times 1$ , hypotype, 110117b; (28) pedicle interior, $\times 2$ , showing spondylium and lateral plates on the edge of the delthyrium, hypotype, 110117a; (29) posterior view, $\times 2$ , of a complete specimen, hypotype, A.M.N.H. 25048/1; (31) brachial exterior, $\times 1$ , hypotype, A.M.N.H. 25048/3; (32) enlargement of the muscle-attachment surface of the pedicle valve, hypotype, Y.P.M. S359; (34) brachial interior showing adductor field, $\times 2$ , hypotype, 110117c.	
Crown Point formation, Sloop Bay, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
G. <i>Atelelasma dorsoconvexum</i> Cooper, new species.....	519
(35) Impression of the pedicle interior, $\times 1$ , paratype, 110129a; (36) plasticine replica of part of the exterior of a pedicle valve, $\times 2$ , paratype, 110129d; (37) another pedicle impression, $\times 1$ , paratype, 110129b; (38) brachial interior impression, $\times 1$ , paratype, 110129c.	
Basal Athens, just east of road intersection, 2½ miles south-southeast of Riceville, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.	
(39) Brachial interior, $\times 2$ , paratype, 110128b.	
Basal Athens, 600 feet S. 40° E. of the railroad crossing 1 mile northeast of the courthouse, Athens, Athens (T.V.A. 125-NE) Quadrangle, Tenn.	

## PLATE 81

## ATELELASMA, PLECTORTHIS

A. <i>Atelelasma variabile</i> Cooper, new species.....	525
(1-5) Respectively side, brachial, pedicle, posterior, and anterior views of a complete specimen, $\times 2$ , holotype, 117015d; (6) posterior view, $\times 3$ , showing plates on side of delthyrium of holotype.	
Lenoir formation (calcarenite below the Mosheim limestone), southwest side of the cemetery behind Friends Church in the north corner of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
B. <i>Atelelasma sulcatum</i> Cooper, new species.....	524
(7-11) Respectively side, posterior, anterior, brachial, and pedicle views, $\times 1$ , of the holotype, 117013; (12) posterior view, $\times 2$ , of the holotype showing lateral plates; (13) part of pedicle valve of holotype, $\times 2$ , showing ornamentation.	
Tulip Creek formation (152 feet above the top of the basal sand), first creek east of U. S. Highway 77, SE¼NE¼NE¼ sec. 25, T. 2 S., R. 1 E., Carter County, Okla.	
C. <i>Atelelasma</i> sp. 2.....	526
(14) Brachial interior, $\times 2$ , figured specimen, 117016.	

- |   | Page |
|---|------|
| Botetourt limestone, junction of Virginia Highways 311 and 114, $\frac{1}{2}$ mile southwest of Catawba, Salem (15') Quadrangle, Va.  |      |
| D. <i>Plectorthis lebanonensis</i> Cooper, new species.....   | 449  |
| (15) Brachial exterior, $\times 2$ , paratype, 110834a; (16) brachial interior, $\times 2$ , paratype, 110834b; (17) pedicle exterior, $\times 2$ , holotype, 110834c.<br>Lebanon formation, on Tennessee Highway 16, 3.6 miles northwest of its junction with U. S. Highway 241, Shelbyville, Bedford County, Tenn.  |      |
| E. <i>Plectorthis tenuis</i> Cooper, new species.....   | 454  |
| (18) Exfoliated pedicle valve showing impression of the muscle area, $\times 1$ , paratype, 117027; (19) impression of the muscle area, $\times 2$ , of the preceding.<br>Benbolt formation, south side of Mount Hagan School, Hilton (T.V.A. 197-NW) Quadrangle, Va.<br>(20, 21) Respectively $\times 1$ and $\times 2$ enlargements of the pedicle valve of a complete specimen, paratype, 117028a; (22-24) respectively pedicle, anterior, and brachial views of a complete specimen, $\times 2$ , paratype, 117028b; (25-27) respectively brachial, side, and posterior views, $\times 2$ , of the holotype, 117028c; (28, 29) side and pedicle views of a large specimen, $\times 2$ , paratype, 117028d.<br>Benbolt formation (base), 0.2 mile south of the middle fork of Moccasin Creek, $1\frac{1}{2}$ miles due south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va. |      |

## PLATE 82

ATELELASMA, CYRTONOTELLA, HESPERORTHIS, ORTHAMBONITES, PIONODEMA,  
PRODUCTORTHIS, PTYCHOPLEURELLA

- |  |     |
|--|-----|
| A. <i>Hesperorthis ? costellata</i> Cooper, new species.....   | 350 |
| (1) Brachial view, $\times 2$ , of the holotype, 116918; (2-6) respectively anterior, posterior, side, pedicle, and brachial views, $\times 1$ , of the holotype.<br>Botetourt formation, north side of Virginia Highway 114, 2.3 miles west of the Montgomery-Roanoke County line, 12 miles northeast of Blacksburg, Va.  |     |
| B. <i>Hesperorthis tenuicostata</i> Cooper, new species.....   | 357 |
| (7-11) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen, $\times 2$ , paratype, 116923.<br>Lenoir formation (shale streak in granular beds below the Mosheim limestone), behind the Quaker Church, north corner of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.   |     |
| C. <i>Productorthis americana</i> Cooper, new species.....   | 336 |
| (12) Exterior of a pedicle valve, $\times 1$ , paratype, 116886b.<br>Horizon and locality same as A above.   |     |
| D. <i>Orthambonites tennesseensis</i> Cooper, new species.....   | 313 |
| (13-17) Respectively brachial, anterior, side, posterior, and pedicle views of a complete specimen, $\times 1$ , holotype, 116878b; (18) brachial view, $\times 1\frac{1}{2}$ , of the preceding specimen; (19) brachial interior showing cardinalia, $\times 2$ , paratype, 116878d; (20) pedicle interior showing thickened anterior end of muscle area, $\times 2$ , paratype, 116878a.<br>Arline formation, 100 yards southwest of the Negro Cemetery, $\frac{1}{2}$ mile northeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn. |     |
| E. <i>Cyrtionotella subquadrata</i> Cooper, new species.....   | 324 |
| (21, 22) Brachial and pedicle views of an imperfect specimen, $\times 1$ , paratype, 116895.<br>Benbolt formation, north side of road, 1.1 miles northeast of Lee Valley, Lee Valley (T.V.A. 171-NW) Quadrangle, Tenn.   |     |

- |  | Page |
|--|------|
| F. <i>Pionodema crassipunctata</i> Cooper, new species.....  | 989  |
| (23-27) Posterior, anterior, brachial, side, and pedicle views, $\times 1$ , of the holotype, 117326.  |      |
| Benbolt formation (base), 0.2 mile south of middle fork of Moccasin Creek, $1\frac{1}{2}$ miles south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.  |      |
| G. <i>Hesperorthis virginiensis</i> Cooper, new species.....   | 359  |
| (28-32) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen, $\times 1$ , holotype, 116927a.  |      |
| Oranda formation, just west of the junction of Virginia County Highways 617 = 910 and 777, on 777, $\frac{1}{4}$ mile north of Green Mount Church, 4 to 5 miles north of Harrisonburg, Broadway (15') Quadrangle, Va.  |      |
| H. <i>Ptychopleurella globularis</i> Cooper, new species.....  | 385  |
| (33, 34) Brachial and posterior views of a complete specimen, $\times 2$ , holotype, 116955c; (35) brachial view, $\times 3$ , of the preceding specimen; (36, 37) interior of a small brachial valve, $\times 3$ , tilted to show cardinalia and in normal interior view, paratype, 116955d; (38) another brachial interior showing the cardinalia, $\times 3$ , paratype, 116955a; (39) pedicle interior showing elongate diductor scars and thickened adductor track, $\times 3$ , paratype, 116955b. |      |
| Horizon and locality same as D above.  |      |
| I. <i>Orthambonites tennesseensis</i> Cooper, new species.....   | 313  |
| (40) Brachial view of a complete specimen, $\times 2$ , paratype, 116881.  |      |
| Horizon and locality same as A above.  |      |
| J. <i>Atelelasma</i> cf. <i>A. decorticatum</i> Cooper, new species.....   | 518  |
| (41, 42) Interior and exterior views of a pedicle valve, $\times 1$ , figured specimen, 117010.  |      |
| Lincolnshire formation, south side of road opposite Shiloh Church, northwest subquad., Pressmens Home (T.V.A. 171-NE) Quadrangle, Tenn.  |      |
| K. <i>Atelelasma variabile</i> Cooper, new species.....  | 525  |
| (43-47) Respectively brachial, anterior, posterior, side, and pedicle views of a complete specimen, $\times 2$ , paratype, 117015c.  |      |
| Horizon and locality same as B above.  |      |
| L. <i>Atelelasma</i> aff. <i>A. variabile</i> Cooper, new species.....   | 525  |
| (48-52) Respectively posterior, side, pedicle, anterior, and brachial views of a well-preserved, complete specimen, $\times 2$ , figured specimen, 117996.   |      |
| Horizon and locality same as B above.  |      |
| M. <i>Atelelasma dorsoconvexum</i> Cooper, new species.....  | 519  |
| (53) Impression of the brachial interior, $\times 2$ , paratype, 117011b; (54) impression of another brachial interior showing pallial marks, $\times 2$ , paratype, 117011f; (55) impression of the pedicle interior, $\times 2$ , showing filling of spondylium, holotype, 117011h; (56) small slab preserving a pedicle and brachial impression, $\times 1$ , paratypes, 117011d, 117011e; (57) the pedicle impression, $\times 2$ , illustrated in the preceding figure.                             |      |
| Athens formation (base), just east of road intersection $2\frac{1}{2}$ miles southeast of Riceville, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.   |      |

## PLATE 83

## DESMORTHIS, PLECTORTHIS

- |  |     |
|--|-----|
| A. <i>Desmorthis nevadensis</i> Ulrich and Cooper.....   | 447 |
| (1, 4) Pedicle exteriors, $\times 2$ , paratypes, 91342c, 91342a; (13) enlargement $\times 4$ of fig. 1 to show hollow costellae; (2, 3) brachial exteriors, $\times 2$ , paratypes, 91344g, 91344c; (6) brachial interior, $\times 3$ , paratype, 91344e; (7) pedicle interior showing small pseudodeltidium, $\times 3$ , paratype, 91344d; (8) pedicle interior |     |

showing musculature and rudimentary pseudodeltidium,  $\times 3$ , holotype, 91344a; (9) brachial interior showing thick delthyrial platform and bladelike cardinal process,  $\times 3$ , paratype, 91344i; (10) brachial interior turned to the side to show brachiophore supports, fulcral plate, and socket,  $\times 4$ , paratype, 91344b; (11) another brachial interior showing cardinal process,  $\times 2$ , paratype, 91344j; (12) brachial exterior,  $\times 2$ , paratype, 91342d; (14, 15) views of the interarea and interior of the pedicle valve showing pseudodeltidium, teeth, and crural fossette,  $\times 4$ , paratype, 91344k.

Upper Pogonip group (*Desmorthis* zone), west end of Lone Mountain, 18 miles northwest of Eureka, Roberts Mountains (1°) Quadrangle, Nev.

(5) Pedicle exterior,  $\times 2$ , figured specimen, 110806a.

Joins formation, SW $\frac{1}{4}$  sec. 2, T. 1 S., R. 1 W., about 4 miles east of Hennepin, Murray County, Okla.

- B. *Plectorthis symmetrica* Cooper, new species..... 453  
(16-20) Respectively brachial, posterior, pedicle, side, and anterior views,  $\times 2$ , of the holotype, 110824a; (21) brachial interior,  $\times 2$ , paratype, 110828a.

Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

- C. *Plectorthis ponderosa* Cooper, new species..... 451

(22-24, 28) Respectively pedicle, brachial, side, and anterior views of a small individual,  $\times 1$ , paratype, 110837b; (25-27) posterior, brachial, and pedicle views of a large specimen,  $\times 1$ , paratype, 110837a; (29) plasticine replica of the brachial interior,  $\times 1\frac{1}{2}$ , paratype, 110837d; (30) impression of the brachial interior,  $\times 1$ , from which the preceding replica was prepared; (31) impression of the pedicle interior,  $\times 1$ , prepared by burning shell, paratype, 110837c; (32) replica of posterior part of pedicle interior,  $\times 2$ , prepared from preceding impression.

Martinsburg formation (basal part with *Brongniartella* referable to Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.

## PLATE 84

### PLECTORTHIS

- A. *Plectorthis transversa* Cooper, new species..... 454  
(1-5) Respectively brachial, posterior, side, anterior, and pedicle views,  $\times 1$ , of the holotype, 98181.

Arline formation, quarry on north side of Marion, Marion (T.V.A. 218-SE) Quadrangle, Va.

- B. *Plectorthis compacta* Cooper, new species..... 448

(6-10) Respectively pedicle, brachial, side, posterior, and anterior views of a perfect specimen,  $\times 1$ , holotype, 110821r; (11-13) respectively posterior, brachial, and pedicle views,  $\times 1$ , of a larger paratype, 110821s; (14) pedicle interior,  $\times 2$ , paratype, 110821-o; (15) brachial interior of a young specimen,  $\times 2$ , paratype, 110821n; (16) brachial interior of a larger specimen than the preceding,  $\times 2$ , paratype, 110821q; (17) posterior of preceding enlarged,  $\times 3$ , to show details of cardinalia.

Arline formation (near middle), north side of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

- C. *Plectorthis* sp. 2..... 455

(18) Brachial interior,  $\times 2$ , figured specimen, 110835a.

Murfreesboro formation (top), from excavation of new armory building at

	Page
junction of west fork of Stone River and U. S. Highway 70, 1½ miles northwest of Murfreesboro, Tenn.	
D. <i>Plectorthis punctata</i> Cooper, new species.....	452
(19-22) Respectively pedicle, side, anterior, and brachial views, × 2, of a paratype, 117024; (23) brachial view, × 1, of the same paratype.	
Tulip Creek formation (152 feet above the top of the basal sand), first creek east of U. S. Highway 77, SE¼NE¼NE¼ sec. 25, T. 2 S., R. 1 E., Carter County, Okla.	
E. <i>Plectorthis ponderosa</i> Cooper, new species.....	451
(24-28) Respectively side, anterior, pedicle, brachial, and posterior views of a perfect specimen, × 1, holotype, 117022a; (29) brachial view, × 1½, of the holotype; (30-32) respectively posterior, pedicle, and brachial views of a large individual, × 1, paratype, 117022b.	
Martinsburg formation (basal part with <i>Brongniartella</i> referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.	
F. <i>Plectorthis punctata</i> Cooper, new species.....	452
(33) Brachial exterior, × 2, holotype, 110836a; (35) anterior of preceding, × 10, showing parallel rows of pits on costae.	
Tulip Creek formation, on West Spring Creek, NW¼ sec. 6, T. 2 S., R. 1 W., 2½ miles east of Pooleville, Murray County, Okla.	
(34) Pedicle exterior, × 2, paratype, 117023b.	
Tulip Creek formation, NE. corner sec. 1, T. 2 S., R. 2 W., 2½ miles east of Pooleville, Murray County, Okla.	

## PLATE 85

## MIMELLA

A. <i>Mimella vulgaris</i> (Raymond).....	488
(1-5) Respectively pedicle, brachial, posterior, anterior, and side views of a complete specimen, × 1, holotype (?), Carnegie Mus. 5512; (6-10) respectively posterior, side, brachial, anterior, and pedicle views of a specimen larger than the preceding, × 1, hypotype, 110796; (11, 12) side and brachial views of a large specimen, × 1, hypotype, 110790a.	
Crown Point formation, south side of Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
B. <i>Mimella nuclea</i> (Butts).....	479
(13, 14) Pedicle and brachial views of a specimen from which the shell has been peeled to show impressions of internal structures, × 1, hypotype, 110773c; (15) brachial view of a complete specimen, × 1, hypotype, 110773b; (16-20) respectively posterior, pedicle, side, brachial, and anterior views of a somewhat exfoliated specimen, × 1, hypotype, 110773a; (21) brachial view of a small individual with well-preserved ornamentation, × 1, hypotype, 110773d; (22-26) respectively posterior, side, anterior, pedicle, and brachial views, × 2, of the preceding.	
Lenoir formation, 1½ miles southwest of Philadelphia, Philadelphia (T.V.A. 131-NW) Quadrangle, Tenn.	
C. <i>Mimella valcourensis</i> Cooper, new species.....	486
(27-31) Respectively brachial, side, anterior, pedicle, and posterior views, × 1, of the holotype, 110792; (32) brachial view, × 2, of the holotype, to show the ornamentation.	
Probably Valcour formation, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	

	Page
D. <i>Mimella transversa</i> Cooper, new species.....	484
(33-37) Respectively posterior, pedicle, side, brachial, and anterior views, $\times 1$ , of the holotype, 117052.	
Valcour formation, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
E. <i>Mimella borealis</i> (Billings).....	469
(38, 39) Brachial and pedicle views, $\times 1$ , of the holotype, G.S.C. 1035c.	
St. Martin formation, Caughnawaga, La Prairie County, Quebec, Canada.	
F. <i>Mimella imperator</i> (Billings).....	475
(40-43) Respectively posterior, pedicle, brachial, and side views of exfoliated specimen, showing muscle impressions of the pedicle valve and the brachial pallial impressions of two brachial interiors, $\times 1$ , hypotype, Carnegie Mus. 5447.	
Aylmer formation (Rockcliffe member), Aylmer, Quebec, Canada.	
(44) Impression of the pedicle interior on sandstone, $\times 1$ , hypotype, Carnegie Mus. 5448; (45) impressions of two brachial interiors, $\times 1$ , hypotype, Carnegie Mus. 5447.	
Horizon and locality same as preceding.	

## PLATE 86

## MIMELLA

A. <i>Mimella extensa</i> Cooper, new species.....	470
(1-5) Respectively posterior, anterior, side, brachial, and pedicle views of a small, complete specimen, $\times 1$ , paratype, 117037j; (6) brachial exterior of a large but somewhat crushed specimen, $\times 1$ , paratype, 110669b; (7, 20) exterior and interior of a large pedicle valve, $\times 1$ , paratype, 110662a; (21) same as preceding, $\times 2$ , enlarged to show pallial markings and muscle scars; (8) pedicle exterior, $\times 2$ , to show ornamentation of a young specimen, paratype, 117037i; (9, 10) brachial interior tilted to side to show brachiophore supports and in normal position, $\times 2$ , paratype, 117037h; (11) brachial interior, $\times 1$ , paratype, 117037f; (12, 13) same specimen as preceding, $\times 2$ , tilted to show brachiophore supports better in normal view; (14) pedicle interior, $\times 1$ , paratype, 117037e; (15, 16) same as preceding, $\times 2$ , tilted to show dental plates and teeth and in normal view; (17) exterior, $\times 2$ , of preceding.	
Bromide formation (Mountain Lake member), road cut on Oklahoma Highway 99, SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 12, T. 1 N., R. 6 E., Pontotoc County, Okla.	
(18, 19) Exterior and interior views of a pedicle valve doubtfully referred to this species, $\times 1$ , figured specimen, 110663.	
Bromide formation (Mountain Lake member), along creek in SW $\frac{1}{4}$ sec. 27, T. 2 S., R. 3 E., $\frac{1}{4}$ miles west and $\frac{3}{4}$ mile south of Nebo, Murray County, Okla.	

## PLATE 87

## MIMELLA

A. <i>Mimella ulrichi</i> Cooper, new species.....	486
(1-5) Respectively brachial, posterior, side, anterior, and pedicle views, $\times 2$ , of the holotype, 110805.	
Crown Point formation, Sloop Bay, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
B. <i>Mimella nucleoidea</i> Cooper, new species.....	480
(6-10) Respectively pedicle, brachial, side, anterior, and posterior views of a complete specimen, $\times 1$ , holotype, 110786; (11) brachial view, $\times 2$ , of holotype; (12, 13) brachial interior in normal position and tilted to show the brachiophore	

- supports,  $\times 2$ , paratype, 110804a; (14, 15) two pedicle interiors,  $\times 2$ , showing muscle scars and pallial marks, paratypes, 110797a, 110797b.  
 Horizon and locality same as preceding.
- C. *Mimella biconvexa* Cooper, new species..... 468  
 (16-18) Respectively pedicle, side, and posterior views,  $\times 1$ , of the holotype, 48755a; (19) impression of the pedicle interior,  $\times 1$ , paratype, 110652a.  
 Pierce formation, Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.
- D. *Mimella sulcata* Cooper, new species..... 483  
 (20-24) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen,  $\times 1$ , holotype, 117053.  
 Benbolt formation, north side of U. S. Highway 19, 1 $\frac{3}{4}$  miles southeast of Hansonville Post Office, Brumley (T.V.A. 205-SE) Quadrangle, Va.
- E. *Mimella globularis* Cooper, new species..... 474  
 (25, 36) Interior and exterior of a pedicle valve,  $\times 1$ , paratype, 110687g; (27, 35) same views,  $\times 2$ , of preceding specimen; (26) another pedicle interior,  $\times 1$ , paratype 110687c; (28) same as preceding,  $\times 2$ ; (29, 37) side and exterior views of a pedicle valve,  $\times 1$ , holotype, 110687d; (30, 31) exterior and side views of a brachial valve,  $\times 1$ , paratype, 110687i; (32, 33) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial interior, paratype, 110687a; (34) posterior of brachial interior showing cardinalia,  $\times 2$ , paratype, 110687f.  
 Potet formation (Yellow Branch member), on road beside Yellow Branch, 5 miles southeast of Rose Hill, Rose Hill (T.V.A. 161-NE) Quadrangle, Va.

## PLATE 88

## MIMELLA

- A. *Mimella globosa* (Willard)..... 472  
 (1-4) Respectively brachial, anterior, pedicle, and side views of medium-sized specimen,  $\times 1$ , hypotype, 117041a; (8) pedicle exterior of the preceding enlarged  $\times 2$  to show details of the ornamentation; (5-7) respectively brachial, posterior, and pedicle views of a small individual,  $\times 1$ , hypotype, 117041b; (9-13) respectively anterior, brachial, pedicle, side, and posterior of a medium-sized specimen, hypotype,  $\times 1$ , 110715; (14-17) respectively pedicle, posterior, side, and brachial views of a specimen larger than the preceding,  $\times 1$ , hypotype, 110718; (30) pedicle interior,  $\times 2$ , showing pallial marks, hypotype, 110713a.  
 Benbolt part of Dryden formation, west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.  
 (18-22) Respectively brachial, anterior, pedicle, posterior, and side views of an obese specimen,  $\times 1$ , hypotype, 110686b; (23) pedicle interior,  $\times 1$ , hypotype, 110686a.  
 Benbolt formation, on Virginia Highway 74, 0.2 mile southwest of Bethel Church,  $\frac{1}{2}$  mile east of the junction with U. S. Highway 54, Hilton (T.V.A. 197-NW) Quadrangle, Va.  
 (24, 25) Respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior showing pallial marks, hypotype, 110752.  
 Dryden formation, 1 mile west of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.  
 (26) Brachial interior,  $\times 1$ , hypotype, 110680.  
 Benbolt formation, on Virginia Highway 74, 5 $\frac{1}{2}$  miles east of the junction with U. S. Highway 54 (Tennessee 71), Hilton (T.V.A. 197-NW) Quadrangle, Va.  
 (27, 28) Interior and tilted view of the brachial interior,  $\times 1$ , hypotype, 117042b;  
 (29) same,  $\times 2$ , showing muscle scars.

Ridley formation, cut on U. S. Highway 27, 4.2 miles north of Rock Spring, Kensington (T.V.A. 106-SE) Quadrangle, Ga.

## PLATE 89

## MIMELLA

- A. *Mimella globosa* (Willard)..... 472  
 (1-4) Respectively brachial, pedicle, posterior, and side views of specimen with well-preserved ornamentation,  $\times 1$ , hypotype, 117040f; (5-8) respectively pedicle, side, anterior, and posterior views of an exceptionally large specimen,  $\times 1$ , hypotype, 117040i; (11, 12) respectively  $\times 1$  and  $\times 2$  enlargements of a very perfect pedicle interior showing details of pallial marks, hypotype, 117040c; (13, 14) respectively  $\times 1$  and  $\times 2$  enlargements of another well-preserved pedicle valve, hypotype, 117040d.  
 Benbolt formation (upper), 0.1 to 0.2 mile north of the road, 1.1 miles north-east of Lee Valley, Lee Valley (T.V.A. 171-NW) Quadrangle, Tenn.  
 (9, 10) Respectively  $\times 1$  and  $\times 2$  enlargements of a brachial valve showing details of the cardinalia, hypotype, 117038b.  
 Benbolt formation, roadside  $\frac{1}{4}$  mile southwest of New Bethel Church, Hilton (T.V.A. 197-NW) Quadrangle, Va.
- B. *Mimella tumida* Cooper, new species..... 485  
 (15-19) Respectively brachial, anterior, side, pedicle, and posterior views of a small specimen,  $\times 1$ , paratype, 110739.  
 Lincolnshire formation (Hogskin member), on the Maynardville Pike, 1.7 miles north of Hall Crossroad, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.  
 (20-23) Respectively posterior, pedicle, side, and anterior views of a large specimen,  $\times 1$ , holotype, 110714.  
 Lincolnshire formation (Hogskin member),  $\frac{3}{4}$  mile southwest of Washburn, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.

## PLATE 90

## MIMELLA

- A. *Mimella extensa* Cooper, new species..... 470  
 (1-5) Respectively pedicle, posterior, side, brachial, and anterior views of a complete specimen,  $\times 1$ , paratype, 117037a; (6-8) respectively side, pedicle, and anterior views of another complete specimen,  $\times 1$ , holotype, 117037c; (9-13) respectively brachial, pedicle, anterior, posterior, and side views of a perfect specimen,  $\times 1$ , paratype, 117037b; (14, 15) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior, paratype, 117037d.  
 Bromide formation (Mountain Lake member), road cut on Oklahoma Highway 99, SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 12, T. 1 N., R. 6 E., 3 miles south of Fittstown, Pontotoc County, Okla.
- B. *Mimella intermedia* Cooper, new species..... 476  
 (16-20) Respectively brachial, anterior, side, posterior, and pedicle views of a complete specimen,  $\times 1$ , holotype, 117044b.  
 Whistle Creek formation, on Whistle Creek, 1 $\frac{1}{2}$  miles northwest of Lexington, Lexington (15') Quadrangle, Va.
- C. *Mimella laticardinia* Cooper, new species..... 477  
 (21-23, 25) Respectively pedicle, side, posterior, and brachial views of a large complete specimen,  $\times 1$ , holotype, 110709a; (24) anterior view of a complete speci-



- |  | Page |
|--|------|
| men, × 1, paratype, 110706b; (26-28) brachial, posterior, and side views of an obese specimen, × 1, paratype, 110700d; (29) pedicle interior, × 1, showing palial marks, paratype, 110700a; (30, 31) interior and exterior of a fine pedicle valve, × 1, paratype, 110700b; (32) interior of a small brachial valve, × 1, paratype, 110702a; (33) enlargement, × 2, of the posterior part of the preceding showing cardinalia; (34) interior of an imperfect brachial valve, × 2, paratype, 110700c. |      |
| Lincolnshire formation, $\frac{1}{2}$ mile north of Eidson on old pasture road, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.   |      |
| D. <i>Mimella wardellana</i> Cooper, new species.....  | 489  |
| (35, 36) Interior and exterior of the brachial valve, × 1, holotype, 117055a; (37, 38) exterior and interior of the pedicle valve, × 1, paratype, 117055b.   |      |
| Wardell formation, Raccoon Valley, $\frac{3}{4}$ mile northeast of Fleanor Mill, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.  |      |
| PLATE 91   |      |
| MIMELLA  |      |
| A. <i>Mimella costellata</i> Cooper, new species.....  | 469  |
| (1-5) Respectively brachial, anterior, side, posterior, and pedicle views of medium-sized specimen, × 1, holotype, 110658a; (6) pedicle view, × 2, of the holotype; (7) brachial view of a convex individual, × 2, paratype, 110658b; (7a) same, × 1, in side view.  |      |
| Lincolnshire formation (Hogskin member), Sally Cleveland Farm, $\frac{3}{4}$ mile southwest of Washburn, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.  |      |
| B. <i>Mimella similis</i> Cooper, new species.....   | 481  |
| (8-11) Respectively brachial, anterior, side, and pedicle views of a complete specimen, × 1, paratype, 117048a.  |      |
| Lincolnshire formation (Hogskin member, 500 feet below the "Holston" marble), Lee Valley Post Office, Lee Valley (T.V.A. 171-NW) Quadrangle, Tenn.   |      |
| (12) Brachial interior, × 2, paratype, 110737.   |      |
| Lincolnshire formation (Hogskin member), 3 miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.  |      |
| C. <i>Mimella similis</i> Cooper, new species.....   | 481  |
| (13-17) Respectively pedicle, posterior, side, brachial, and anterior views of a complete specimen, × 1, holotype, 117046a; (18) pedicle interior, × 2, paratype, 117046b.   |      |
| Lincolnshire formation (Hogskin member), 0.2 mile northwest on farmer's lane, $\frac{1}{2}$ mile southwest of Fleanor Mill, Raccoon Valley, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.   |      |
| D. <i>Mimella</i> sp. 1.....   | 490  |
| (19-21) Respectively posterior, pedicle, and brachial views of a small specimen, × 1, figured specimen, 117056b; (22-24) respectively side, pedicle, and brachial views of a specimen larger but less well preserved than the preceding, × 1, figured specimen, 117056a.   |      |
| Elway formation, cut on U. S. Highway 25W, 4.7 miles south of Clinton, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.  |      |
| E. <i>Mimella intermedia</i> Cooper, new species.....  | 476  |
| (25) Posterior part of brachial interior, × 2, paratype, 117998.   |      |
| Horizon and locality same as preceding.  |      |

- |  | Page |
|--|------|
| F. <i>Mimella intermedia</i> Cooper, new species.....  | 476  |
| (26-28) Respectively pedicle, side and brachial views of a small specimen, $\times 1$ , paratype, 117043.  |      |
| Whistle Creek formation, on U. S. Highway 60, 100 yards southeast of Whistle Creek, 2 miles northeast of Lexington, Lexington (15') Quadrangle, Va.  |      |
| G. <i>Mimella</i> sp. 2.....   | 490  |
| (29) Pedicle view of the exterior, $\times 1$ , of a complete individual, figured specimen, 117057; (30-34) respectively brachial, pedicle, posterior, anterior, and side views, $\times 2$ , of the same specimen.  |      |
| Tulip Creek formation (152 feet above the top of the basal sandstone), first creek east of U. S. Highway 77, SE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 25, T. 2 S., R. 1 E., Carter County, Okla.  |      |
| H. <i>Mimella virginiensis</i> Cooper, new species.....  | 487  |
| (35, 36) Respectively $\times 1$ and $\times 2$ views of an impression of the pedicle interior showing the form of the muscle area, paratype, 110694.  |      |
| Whistle Creek formation, top of the ridge, 1,000 feet north of the road on Buffalo Creek, 2 $\frac{1}{2}$ miles due west of Murat, Natural Bridge (15') Quadrangle, Va.  |      |
| I. <i>Mimella intermedia</i> Cooper, new species.....  | 476  |
| (37, 38) Impression of the brachial interior in normal view and tilted to show the slots produced by the brachiophore supports and median ridge, $\times 1$ , paratype, 110703a; (39) small slab showing a pedicle interior impression and a partially exposed brachial interior impression, $\times 1$ , paratype, 110703b. |      |
| Elway formation, along the road over Marble Bluff, just north of Summit, about 8 miles west-northwest of Loudon, Loudon (30') Quadrangle, Tenn.  |      |
| J. <i>Mimella</i> sp. 3.....   | 491  |
| (40) Posterior portion of a large brachial valve, $\times 2$ , showing cardinalia, figured specimen, 117058b.  |      |
| Lincolnshire formation, just east of Strasburg Junction, Strasburg (15') Quadrangle, Va.   |      |

## PLATE 92

## DOLEROIDES, MIMELLA, PLECTORTHIS, SKENIDIOIDES

- |   |     |
|---|-----|
| A. <i>Doleroides oklahomensis</i> Cooper, new species.....  | 461 |
| (1, 4) Pedicle interiors showing characteristic form of muscle area, $\times 2$ , paratypes, 117033g, 117033h; (2, 3) brachial interiors, $\times 2$ , paratypes, 117033c, 117033d.   |     |
| Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), quarry on the east side of Oklahoma State Highway 18, center NW $\frac{1}{4}$ sec. 11, T. 1 S., R. 3 E., about 1.8 miles south of Sulphur, Murray County, Okla.  |     |
| B. <i>Mimella subquadrata</i> Cooper, new species.....  | 483 |
| (5-9) Respectively anterior, posterior, side, brachial, and pedicle views of a nearly complete specimen, $\times 1$ , holotype, 117050a.  |     |
| Bromide formation (Mountain Lake member— <i>Sowerbyites</i> bed), 25 to 46 feet above the basal sand, Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.   |     |
| C. <i>Skenidioides elongatus</i> Cooper, new species.....   | 494 |
| (10) Brachial view of a complete specimen, $\times 1$ , holotype, 117073a; (11, 14, 16) pedicle, side, and anterior views, $\times 2$ , of the holotype; (17) pedicle view of another complete specimen, $\times 1$ , paratype, 117073b; (12, 13, 15) respectively pedicle, anterior, and posterior views, $\times 2$ , of the preceding; (18-22) respec- |     |

- tively anterior, side, posterior, pedicle, and brachial views of a smaller but more perfect specimen than the two preceding,  $\times 3$ , paratype, 117073c.
- Martinsburg formation (portion with *Brongniartella* and referable to the Salona), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.
- D. *Mimella similis* Cooper, new species..... 481  
 (23-27) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen,  $\times 2$ , paratype, 117047a; (28) brachial view,  $\times 1$ , of the preceding.  
 Lincolnshire formation (Hogskin member), 0.4 mile northeast of Red Hill, 4½ miles south-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.
- E. *Mimella vulgaris* (Raymond)..... 488  
 (29-33) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen,  $\times 1$ , hypotype, 117054.  
 St. Martin formation, Belanger, 2 miles south of Cap St. Martin, Quebec, Canada.
- F. *Plectorthis obesa* Cooper, new species..... 450  
 (34-38) Respectively brachial, posterior, side, anterior, and pedicle views of a large specimen,  $\times 1$ , holotype, 117020.  
 Dark shale under Eureka quartzite, ridge east of Martin Ranch, Roberts Mountains (1°) Quadrangle, Nev.
- G. *Plectorthis pennsylvanica* Cooper, new species..... 451  
 (39-43) Respectively anterior, posterior, pedicle, side, and brachial views of a complete specimen,  $\times 1$ , holotype, 117021a; (44) brachial view,  $\times 2$ , of the preceding.  
 Rodman member of Nealmont formation, on the east side of the south quarry at Sparr, Huntingdon (15') Quadrangle, Pa.
- H. *Plectorthis symmetrica* Cooper, new species..... 453  
 (45-49) Respectively posterior, side, anterior, pedicle, and brachial views of an exceptionally good specimen,  $\times 2$ , paratype, 110828d; (50) same specimen,  $\times 1$ , in brachial view.  
 Bromide formation (Pooleville member—*Oxoplectica gouldi* zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

## PLATE 93

## DOLEROIDES

- A. *Doleroides winchelli* Cooper, new name..... 466  
 (1-5) Respectively pedicle, brachial, posterior, anterior, and side views,  $\times 1$ , of a hypotype, 110578a; (6, 7) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior, hypotype, 110578b.  
 Decorah formation (Spechts Ferry member), Fountain, Fillmore County, Minn.
- B. *Doleroides gibbosus* (Billings)..... 458  
 (8-12) Respectively posterior, pedicle, anterior, brachial, and side views of a complete specimen, hypotype, 24772a; (14) anterior part of preceding specimen,  $\times 2$ , showing hollow costellae.  
 Decorah formation (Spechts Ferry member), Elmira, Olmsted County, Minn.  
 (13) Pedicle interior showing typical form of *Doleroides* muscle area,  $\times 2$ , hypotype, 24760.

	Page
Decorah formation (Spechts Ferry member), Fountain, Fillmore County, Minn.	
C. <i>Doleroides tennesseensis</i> Cooper, new species.....	465
(15-19) Respectively pedicle, brachial, posterior, side, and anterior views, $\times 1$ , of the holotype, 117034a.	
Lebanon formation ( <i>Doleroides</i> beds), on U. S. Highway 70N under the east end of the bridge over Round Lick Creek, Rome, Smith County, Tenn.	
(20-24) Respectively anterior, pedicle, side, posterior, and brachial views of another complete specimen, $\times 1$ , paratype, 110635a; (30) anterior of the preceding, $\times 8$ , showing hollow costellae and exopunctae; (26) pedicle interior, $\times 2$ , showing muscle scars, particularly the adjustors, paratype, 110635f.	
Lebanon formation, on U. S. Highway 41, $\frac{3}{4}$ mile south of Knox Branch, 9 miles southeast of Murfreesboro, Tenn.	
(25) Pedicle interior of a narrow-hinged specimen, $\times 1$ , paratype, 110628.	
Lebanon formation, Columbia, Maury County, Tenn.	
(27) Another pedicle interior, $\times 2$ , paratype, 110639i; (28, 29) brachial interior in normal view and tilted to show brachiophore supports, $\times 2$ , paratype, 110639e.	
Lebanon formation, opposite Fairview Service Station on U. S. Highway 70N, $\frac{1}{2}$ mile west of Rome, Smith County, Tenn.	

## PLATE 94

## DOLEROIDES

A. <i>Doleroides</i> cf. <i>D. tennesseensis</i> Cooper, new species.....	465
(1) Pedicle interior, $\times 2$ , figured specimen, 118002c; (2) brachial interior, $\times 1$ , figured specimen, 118002b; (3) exterior of the pedicle valve, $\times 1$ , figured specimen, 118002a.	
Cane Creek formation (95 feet above base), north of Chattels Station Church, old U. S. Highway 58, 2 miles west-southwest of Ewing, Ewing (T.V.A. 161-NW) Quadrangle, Va.	
B. <i>Doleroides missouriensis</i> Cooper, new species.....	460
(4, 5) Respectively $\times 1$ and $\times 2$ enlargements of a nearly perfect pedicle interior, holotype, 110582b; (6) exterior of the pedicle valve, $\times 1$ , paratype, 110582d; (7) exterior of the brachial valve, $\times 1$ , paratype, 110582a; (8) brachial interior, $\times 1$ , paratype, 110582n.	
Macy formation (Zell member), on old road 1 mile northwest of the Chicago Summer School Camp, NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 32, T. 37 N., R. 9 E., Ste. Genevieve County, Mo.	
C. <i>Doleroides ? ponderosus</i> Cooper, new species.....	463
(9, 10) Pedicle and brachial views of a specimen showing ornamentation well, $\times 1$ , paratype, 110784; (13) impression of the pedicle interior prepared by burning shell, $\times 1$ , paratype, 98225c; (14-17) respectively anterior, brachial, side, and pedicle views of an exfoliated specimen showing size and shape, $\times 1$ , holotype, 98225b; (18) interior of an imperfect brachial valve, $\times 1$ , paratype, 110778a.	
Effna formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.	
(11, 12) Pedicle and brachial views of an imperfect specimen, $\times 1$ , paratype, 110774.	
Effna formation, lower part of McNutt Quarry, 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.	
D. <i>Doleroides ? cf. D. ? ponderosus</i> Cooper, new species.....	463
(19) Plasticine replica of the pedicle exterior, $\times 1$ , figured specimen, 118003a; (20) interior, posterior parts of pedicle and brachial valves, probably of the same	

individual,  $\times 1$ , figured specimen, 118003c; (21) same as preceding enlarged,  $\times 2$ , to show details of the internal impressions.

Botetourt formation, road cut at the junction of Virginia Highways 731 and 724, 2 miles northwest of Brownsburg, Lexington (15') Quadrangle, Va.

## PLATE 95

## DOLEROIDES

- A. *Doleroides crassus* Cooper, new species..... 457  
 (1-5) Respectively posterior, brachial, side, pedicle, and anterior views of a complete specimen,  $\times 1$ , holotype, 110742b.  
 Ridley formation, cut on U. S. Highway 27, just northwest of Chickamauga Creek, Kensington (T.V.A. 106-SE) Quadrangle, Ga.
- B. *Doleroides extensus* Cooper, new species..... 457  
 (6-10) Respectively pedicle, posterior, side, anterior, and brachial views of a small specimen,  $\times 1$ , paratype, 117031; (11) brachial view,  $\times 2$ , of the preceding.  
 Ridley formation, quarry on the west side of the road  $1\frac{1}{2}$  miles south-south-east of Cove Church, 5 miles south of Chickamauga, Kensington (T.V.A. 106-SE) Quadrangle, Ga.  
 (12-16) Respectively posterior, anterior, side, pedicle, and brachial views of a full-grown specimen,  $\times 1$ , holotype, 117030; (17, 18) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial interior, paratype, 117032a; (19, 20) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior, paratype, 117032b.  
 Horizon and locality same as preceding.
- C. *Doleroides regularis* Cooper, new species..... 464  
 (21-25) Respectively brachial, side, posterior, anterior, and pedicle views of a complete specimen,  $\times 1$ , holotype, 118005a.  
 Wardell formation (top 40 feet), on Virginia Highway 610 at the southwest base of Paint Lick Mountain, Pounding Mill (15') Quadrangle, Va.  
 (26) Brachial interior,  $\times 2$ , figured specimen, 110592a.  
 Pierce formation, Murfreesboro, Tenn.  
 (27, 28) Respectively  $\times 2$  and  $\times 1\frac{1}{2}$  enlargements of two pedicle interiors, paratypes, 110646f, 110646a.  
 Dryden formation (30 feet above the marble), road along Sycamore Creek,  $\frac{1}{2}$  mile northeast of the west edge of the Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.
- D. *Doleroides* sp. 1..... 467  
 (29) Impression of the pedicle interior, showing muscle scars,  $\times 1$ , figured specimen, 118004b; (30) exterior of the pedicle valve of a large specimen,  $\times 1$ , figured specimen, 118004a.  
 Pierce formation, Pierce Mill, on Tennessee Highway 10, just south of Walterhill,  $7\frac{1}{2}$  miles north-northeast of Murfreesboro, Tenn.
- E. *Doleroides irregularis* Cooper, new species..... 459  
 (31-35) Respectively side, posterior, brachial, pedicle, and anterior views of a complete specimen,  $\times 1$ , holotype, 110648a; (36) brachial view of the preceding,  $\times 1\frac{1}{2}$ , showing ornamentation.  
 Dryden formation, 1 mile west of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.  
 (37) Pedicle interior of an imperfect specimen,  $\times 2$ , paratype, 110510a.  
 Dryden formation, Lone Mountain, Tenn.  
 (38, 39) Tilted and normal views of the brachial interior,  $\times 2$ , paratype, 118006a.

Benbolt part of Dryden formation, on the Tazewell-Lone Mountain road, 1½ miles northeast of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.

Page

PLATE 96

DOLEROIDES

- A. *Doleroides oklahomensis* Cooper, new species..... 461  
 (1-5) Respectively brachial, pedicle, anterior, posterior, and side views of a complete specimen, × 1, paratype, 110600a; (6-9) respectively posterior, pedicle, brachial, and side views, × 1, of the holotype, 110603a; (10-14) respectively posterior, anterior, pedicle, brachial, and side views, × 2, of the holotype; (15-19) respectively side, anterior, posterior, pedicle, and brachial views of a large and obese specimen, × 2, paratype, 110603b; (20) interior of a pedicle valve, × 2, paratype, 110613; (21) brachial interior, × 2, paratype, 110602b.

Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

- B. *Doleroides compressus* Cooper, new species..... 456  
 (22-26) Respectively pedicle, posterior, anterior, side, and brachial views, × 1, of the holotype, 110607c; (29-33) respectively anterior, brachial, side, posterior, and pedicle views, × 2, of the holotype, showing ornamentation; (27, 28) × 1 and × 2 enlargements of another complete specimen, paratype, 110607d; (34) pedicle interior, × 2, paratype, 110607a; (35) pedicle interior, × 2, paratype, 110607e; (36, 37) respectively × 1 and × 2 enlargements of the brachial interior, paratype, 110596a; (38) brachial interior showing brachiophore supports, × 2, paratype, 110607f.

Bromide formation (Mountain Lake member), cut on Oklahoma Highway 18, sec. 11, T. 1 S., R. 3 E., 1.8 miles south of Sulphur, Murray County, Okla.

PLATE 97

SKENIDIROIDES

- A. *Skenidioides oklahomensis* Cooper, new species..... 498  
 (1-3) Respectively brachial, posterior, and pedicle views of a small specimen, × 4, paratype, 117079d; (4-7) respectively anterior, brachial, side, and posterior views of a large specimen, × 4, holotype, 117079a; (12) brachial views, × 1, of the two preceding specimens; the larger one is represented by figs. 4-7, and the smaller by figs. 1-3; (8-10) respectively posterior, pedicle, and brachial views of a small specimen, × 4, paratype, 117079e; (11) pedicle view of a larger specimen, × 4, paratype, 117079f.

Bromide formation (Mountain Lake member), 30 to 34 feet below top of bed 10 of Decker, on Tulip Creek, SW¼NW¼NE¼ sec. 25, T. 2 S., R. 1 E., Carter County, Okla.

- B. *Skenidioides obtusus* Cooper, new species..... 497  
 (13-17) Respectively posterior, pedicle, anterior, side, and brachial views of a complete specimen, × 4, holotype, 117078a; (18) pedicle interior, × 4, showing spondylium, paratype, 117078b.

Edinburg formation (near middle of *Nidulites* zone), 100 yards south of Battlefield Crystal Cavern entrance on U. S. Highway 11, 1 mile north of Strasburg, Va.

- C. *Skenidioides mediocostatus* Cooper, new species..... 496  
 (19-22) Respectively brachial, anterior, pedicle, and posterior views of a complete

specimen,  $\times 4$ , paratype, 117075a; (28-32) respectively brachial, pedicle, side, anterior, and posterior views of a small individual,  $\times 4$ , paratype, 117075b; (33) pedicle interior,  $\times 4$ , paratype, 117075c.

Bembolt formation (base), 1 mile west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

(23-27) Respectively posterior, brachial, side, pedicle, and anterior views of a perfect specimen,  $\times 4$ , holotype, 117076a.

Bembolt formation (base), 0.2 mile south of the middle fork of Moccasin Creek,  $1\frac{1}{2}$  miles due south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.

(34, 35) Pedicle interior respectively tilted to the side,  $\times 4$ , and in normal view,  $\times 6$ , to show free spondylium, paratype, 117077d; (36) small brachial interior,  $\times 6$ , paratype, 117077c; (37) posterior of brachial valve showing cardinalia,  $\times 6$ , paratype, 117077j.

Chatham Hill formation, on Marion-Chatham Hill road, 6 miles north of Marion, Chatham Hill (T.V.A. 218-NE) Quadrangle, Va.

D. *Skenidioides costatus* Cooper, new species..... 493

(38-40) Respectively posterior, pedicle, and brachial views of a small individual,  $\times 4$ , paratype, 117072i; (42-45) respectively posterior, pedicle, brachial, and side views of a complete specimen,  $\times 4$ , holotype, 117072f; (41) posterior view of a small specimen,  $\times 4$ , paratype, 117072j; (46) view of the cardinalia and spondylium as seen from the front margin,  $\times 6$ , paratype, 117072a; (47) pedicle interior,  $\times 6$ , paratype, 117072c; (48) brachial interior, showing fulcral plates and brachiophore supporting plates,  $\times 6$ , paratype, 117072b.

Edinburg formation (lower Liberty Hall facies), 1.8 miles S. 4° W. of Bethel Church, 5.9 miles east of Harrisonburg, Harrisonburg (15') Quadrangle, Va.

E. *Skenidioides perfectus* Cooper, new species..... 499

(49-53) Respectively pedicle, posterior, side, anterior, and brachial views of a complete specimen,  $\times 4$ , holotype, 117080; (54) pedicle view of a small specimen attached in living position to *Hesperorthis sulcata* Cooper,  $\times 2$ , figured specimen, 109987d.

Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), branch of Hickory Creek, NW $\frac{1}{4}$  sec. 26, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

#### PLATE 98

#### SKENIDIOIDES

A. *Skenidioides elongatus* Cooper, new species..... 494

(1-5) Respectively brachial, anterior, side, posterior, and pedicle views of a large specimen,  $\times 2$ , paratype, 117073e.

Martinsburg formation (part with *Brongniartella* and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.

B. *Skenidioides rectangulatus* Cooper, new species..... 500

(6-10) Respectively pedicle, anterior, side, posterior, and brachial views of a nearly perfect specimen,  $\times 3$ , holotype, 117085c.

Oranda formation, along the railroad  $\frac{1}{2}$  mile west of Strasburg, Strasburg (15') Quadrangle, Va.

C. *Skenidioides transversus* Cooper, new species..... 501

(11, 12, 14) Respectively interior, exterior, and side views of the pedicle valve,  $\times 4$ , holotype, 117086c; (13, 15, 17) respectively exterior, interior, and posterior views of the brachial valve,  $\times 4$ , paratype, 117086d; (16) brachial interior,  $\times 4$ , paratype, 117086g.

	Page
Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.	
D. <i>Skenidioides</i> cf. <i>S. perfectus</i> Cooper, new species.....	499
(18-22) Respectively anterior, pedicle, brachial, posterior, and side views of a complete specimen, $\times 4$ , figured specimen, 117082c; (23) brachial interior, $\times 4$ , figured specimen, 117082b.	
Bromide formation (Pooleville member), SE $\frac{1}{4}$ sec. 32, T. 2 S., R. 2 E., 3 miles northeast of Springer, Carter County, Okla.	
E. <i>Skenidioides oklahomensis</i> Cooper, new species.....	498
(24) Brachial interior, $\times 4$ , paratype, 118007c; (25) pedicle exterior, $\times 4$ , paratype, 118007a; (26) brachial exterior, $\times 4$ , paratype, 118007d; (27) pedicle interior, $\times 4$ , paratype, 118007b.	
Bromide formation (Mountain Lake member), slightly north of the middle of sec. 32, T. 2 S., R. 2 E., 3 miles northeast of Springer, Carter County, Okla.	
F. <i>Skenidioides platys</i> Cooper, new species.....	500
(28) Pedicle exterior, $\times 3$ , holotype, 117084.	
Little Oak formation, 600 feet east of the intersection of Cahaba Valley and Helena roads, $\frac{1}{2}$ mile north of Pelham, Bessemer Iron District (15') Quadrangle, Ala.	
(29) Impression of the brachial interior, $\times 4$ , paratype, 117083a.	
Little Oak formation, 1 mile north of Pelham, Bessemer Iron District (15') Quadrangle, Ala.	
G. <i>Skenidioides halli</i> (Hall and Clarke).....	495
(30) Small slab showing numerous pedicle and brachial valves, $\times 3$ , hypotype, 117074.	
Lebanon formation, Columbia, Tenn.	
H. <i>Skenidioides anthonensis</i> (Sardeson).....	491
(31-35) Respectively side, anterior, posterior, brachial, and pedicle views, $\times 6$ , hypotype, 24207a; (36) brachial exterior, $\times 4$ , hypotype, 48911a; (37) pedicle exterior, $\times 4$ , hypotype, 48911b.	
Platteville formation, Minneapolis, Minn.	
PLATE 99	
ANCISTRORHYNCHA, ELASMOTHYRIS, EREMOTOECHIA, GENUS AND SPECIES UNDET., KULLERVO, MIMELLA, ONYCHOPELCIA, OXOPELCIA, SKENIDIOIDES, TROPIDOTHYRIS	
A. <i>Tropidothyris pentagona</i> Cooper, new species.....	507
(1-5) Respectively anterior, posterior, side, brachial, and pedicle views of a large specimen, $\times 5$ , holotype, 117087a; (6-10) respectively pedicle, brachial, side, anterior, and posterior views, $\times 5$ , paratype, 117087b; (11, 12) two views of the pedicle interior showing the spondylium, ca. $\times 8$ , paratype, 117087e; (13, 14) two brachial interiors in different positions and showing the median ridge, supporting plates of the brachiophores, and brachiophores, ca. $\times 8$ , paratypes, 117087c, 117087d.	
Pratt Ferry formation (lower 3 feet), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
B. <i>Kullervo sulcata</i> Cooper, new species.....	529
(15-18) Respectively apical, exterior, interior, and posterior views of the pedicle valve showing the spondylium with 3 grooves, $\times 4$ , holotype, 117017.	
Horizon and locality same as preceding.	
C. Genus and species undet.....	1006
(19) Exterior of the pedicle valve, $\times 1\frac{1}{2}$ , figured specimen, 117067.	



	Page
Athens formation (base), just above the quarry at the railroad crossing 1 mile northeast of Athens, Athens (T.V.A. 125-NE) Quadrangle, Tenn.	
D. <i>Mimella piger</i> (Billings).....	481
(20-23) Respectively side, brachial, pedicle, and anterior views, $\times 1$ , hypotype, Y.P.M. 15823.	
Mingan formation, Parroquet Island, Mingan Group, St. Lawrence River, Canada.	
E. <i>Skenidioides convexus</i> Cooper, new species.....	492
(24-28) Respectively brachial, anterior, posterior, side, and pedicle views of a complete specimen, $\times 4$ , holotype, 117070a; (29-32) respectively side, pedicle, posterior, and brachial views of an imperfect specimen, $\times 4$ , paratype, 117070b; (33) interior of the pedicle valve, $\times 4$ , showing spondylium, paratype, 117070c; (34) brachial interior showing septum and cardinalia, $\times 4$ , paratype, 117070d.	
Horizon and locality same as A above.	
F. <i>Elasmothyris concinnula</i> Cooper, new species.....	985
(35-39) Respectively side, brachial, pedicle, posterior, and anterior views, $\times 5$ , of the holotype, 117371a; (40) pedicle interior showing the muscle plate, $\times 8$ , paratype, 117371c; (41) brachial interior showing median septum and cardinalia, $\times 8$ , paratype, 117371d; (42) pedicle exterior of a large specimen, $\times 5$ , paratype, 117371b.	
Horizon and locality same as A above.	
G. <i>Kullervo punctata</i> Cooper, new species.....	528
(43, 45) Respectively $\times 2$ and $\times 3$ enlargements of a pedicle valve seen from the posterior side to show the elaborate spondylium, holotype, 117018a; (44) interior of the brachial valve showing the greatly thickened cardinalia, $\times 2$ , paratype, 117018b; (46) a fragmentary specimen showing the exterior ornamentation, $\times 2$ , paratype, 117018c: Note small pseudodeltidium at apex of holotype.	
Botetourt ? formation, in the field on the south side of the road 0.2 mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.	
H. <i>Eremotoechia silicica</i> Cooper, new species.....	515
(48) Exterior of the brachial valve, $\times 2$ , holotype, 117064a; (49) another brachial exterior, $\times 2$ , paratype, 117064b; (50, 51) interior and posterior views, $\times 3$ , of the preceding brachial valve showing the cardinalia; (52) exterior of an imperfect pedicle valve, $\times 2$ , paratype, 117064c; (47) interarea of the preceding pedicle valve, $\times 3$ , showing the pseudodeltidium.	
Horizon and locality same as A above.	
I. <i>Ancistrorhyncha crassa</i> Cooper, new species.....	623
(53-55) Side, anterior, and brachial views of a small adult, $\times 2$ , paratype, 111178b; (56-60) respectively pedicle, posterior, side, anterior, and brachial views of the holotype, $\times 2$ , 111178a; (61) brachial view, $\times 1$ , of the holotype.	
Peery formation, 7 miles southwest of Clinton, Clinton (T.V.A. 137-SW) Quadrangle, Tenn.	
J. <i>Oxoplecia holstonensis</i> Willard.....	545
(62, 64) Exterior and interior of a pedicle valve showing the pseudodeltidium with its elevated ridge, $\times 2$ , hypotype, 117108; (63) exterior, $\times 1$ , of the same specimen.	
Horizon and locality same as G above.	
K. <i>Onychoplecia brevirostris</i> Cooper, new species.....	530
(65-69) Respectively pedicle, brachial, anterior, posterior, and side views, $\times 3$ , holotype, 117089a; (70) brachial exterior of the preceding specimen, $\times 4$ , showing the ridge on the pseudodeltidium.	
Lenoir formation (shale band in the calcarenite below the Mosheim lime-	

stone), southeast side of the Friends Church, north corner of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

## PLATE 100

## ONYCHOPLECIA, OXOPLECIA, TRIPLESIA

- A. *Onychoplecia longirostris* (Billings)..... 533  
 (1-3) Respectively side, brachial, and pedicle views,  $\times 2$ , of the holotype, G.S.C. 1039.  
 Mingan formation, Mingan Islands, St. Lawrence River, Canada.
- B. *Onychoplecia kindlei* Cooper, new species..... 532  
 (4-7) Respectively side, pedicle, anterior, and brachial views of a perfect specimen,  $\times 4$ , holotype, 117092a; (8, 10) exterior and anterior views of a brachial valve,  $\times 4$ , paratype, 117092b; (9) exterior of a pedicle valve showing the deep sulcus,  $\times 4$ , paratype, 117092d.  
 Table Head series, Table Point Cove, Newfoundland.
- C. *Onychoplecia gracilis* (Raymond)..... 531  
 (11-13) Respectively anterior, side, and pedicle views, of an unusually perfect specimen,  $\times 3$ , hypotype, Carnegie Mus. 5457; (14) brachial view of the preceding,  $\times 4$ , showing pseudodeltidium.  
 Crown Point formation, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.
- D. *Onychoplecia brevisrostris* Cooper, new species..... 530  
 (15, 16) Anterior and brachial views of a large specimen,  $\times 2$ , paratype, 117089c; (17) pedicle view of another large specimen,  $\times 2$ , paratype, 117089b; (19) brachial view of another small specimen,  $\times 1$ , paratype, 117089d; (18) brachial view of a small specimen preserving the beak,  $\times 1$ , paratype, 117089e; (20-22) respectively pedicle, side, and brachial views,  $\times 3$ , of the preceding.  
 Lenoir formation (calcarenite below the Mosheim limestone), southwest side of the cemetery behind the Friends Church, north corner of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- E. *Onychoplecia obesa* Cooper, new species..... 534  
 (23, 25) Brachial and side views of a large brachial valve,  $\times 2$ , holotype, 117090b; (24) brachial view,  $\times 1$ , of the preceding; (26, 27) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle valve showing the long beak, paratype, 117090a.  
 Row Park formation, (*Maclurites* bed 175 feet above the "Mosheim" limestone),  $\frac{1}{8}$  to  $\frac{1}{4}$  mile east-northeast of the railroad cut on creek,  $2\frac{1}{2}$  miles southwest of Marion, Chambersburg (15') Quadrangle, Pa.
- F. *Onychoplecia* cf. *O. brevisrostris* Cooper, new species..... 530  
 (28) Exterior of the pedicle valve,  $\times 2$ , figured specimen, 118009a; (29) exterior of the brachial valve,  $\times 2$ , figured specimen, 118009b.  
 Lenoir formation (3 feet above the Mosheim limestone), west of the railroad station and just south of Friends Church, Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- G. *Oxoplecia holstonensis* Willard..... 545  
 (30-34) Respectively anterior, posterior, side, brachial, and pedicle views of a complete but decorticated specimen,  $\times 1$ , hypotype, 117106b.  
 Effna formation, 1 mile east of Tilson Mill, 16 miles northeast of Marion, Nebo (T.V.A. 223-NW) Quadrangle, Va.
- H. *Triplesia subcarinata* Cooper, new species..... 538  
 (35-37) Respectively posterior, side, and exterior views of a brachial valve,  $\times 2$ , paratype, 117094b; (38-40) respectively exterior, side, and anterior views of the pedicle valve,  $\times 2$ , holotype, 117094a.  
 Lebanon formation, Columbia, Maury County, Tenn.

	Page
I. <i>Triplesia carinata</i> Cooper, new species.....	537
(41-43) Respectively side, exterior, and posterior views of a brachial valve, $\times 2$ , holotype, 117095a. Pratt Ferry formation, 0.2 mile south of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
J. <i>Oxoplectia depressa</i> Cooper, new species.....	540
(44-48) Respectively anterior, side, posterior, pedicle, and brachial views, $\times 2$ , of the holotype, 117100b; (49) brachial view, $\times 1$ , of the preceding. Effna formation, 4 miles southwest of Bland, Bland County, Va.	
K. <i>Oxoplectia tenuis</i> Cooper, new species.....	535
(50) Brachial view of a complete specimen, showing fold on pseudodeltidium, $\times 4$ , holotype, 117091. Bromide formation (Mountain Lake member), McLish Ranch, sec. 24, T. 1 S., R. 7 E., Johnston County, Okla.	

## PLATE IOI

## OXOPLECTIA

A. <i>Oxoplectia simulatrix</i> (Bassler).....	556
(1-5) Respectively posterior, pedicle, side, brachial, and anterior views of a large individual, $\times 1$ , hypotype, 97599a; (6-10) respectively side, pedicle, posterior, anterior, and brachial views of a small complete specimen, $\times 1$ , hypotype, 117127. Oranda formation (lower), on Virginia County Road 777 just west of its junction with County Road 617 = 910, $\frac{1}{4}$ mile north-northwest of Green Mount Church, Broadway (15') Quadrangle, Va.	
B. <i>Oxoplectia simulatrix</i> (Bassler).....	556
(11) Brachial view of an immature specimen, $\times 1$ , paratype, 117128 (ex U.S.N.M. 66174); (12-15) respectively anterior, side, brachial, and pedicle views, $\times 2$ , of the same specimen. Oranda formation, along the railroad, $\frac{1}{2}$ mile west of Strasburg, Strasburg (15') Quadrangle, Va.	
C. <i>Oxoplectia occidentalis</i> (Butts).....	551
(16-20) Respectively pedicle, anterior, side, brachial, and posterior views of a complete specimen, $\times 1$ , hypotype, 117116a; (21, 22) brachial and pedicle views of another specimen, $\times 2$ , hypotype, 117116b. Bromide formation (149 feet below top), $\frac{1}{4}$ mile west of U. S. Highway 77, sec. 25, T. 2 S., R. 1 E., Carter County, Okla.	
D. <i>Oxoplectia holstonensis</i> Willard.....	545
(23-27) Respectively anterior, brachial, side, posterior, and pedicle views of a large, obese specimen, $\times 1$ , hypotype, 117107; (42) pedicle interior showing interarea and pseudodeltidium, $\times 2$ , hypotype, 117102a; (43) posterior view of a brachial interior showing the base of the shaft of the cardinal process, $\times 2$ , hypotype, 117102b. Effna formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va. (28-30, 32) Respectively anterior, posterior, brachial, and pedicle views of a complete specimen, $\times 1$ , hypotype, 117105b. Edinburg formation (Liberty Hall facies (base)), 1 mile northwest of Lexington, Lexington (15') Quadrangle, Va. (31, 33, 34, 35) Respectively posterior, side, pedicle, and brachial views of an incomplete but strongly costellate specimen, $\times 1$ , hypotype, 117106c; (36, 37) brachial and pedicle views of a well-preserved youthful specimen, $\times 1$ , hypotype, 117106d; (38) exterior of a pedicle valve, $\times 1$ , hypotype, 117106f; (39, 40)	

another well-preserved small specimen,  $\times 2$ , hypotype, 117106e; (41) pedicle view,  $\times 4$ , of the preceding.

Effna formation, 1 mile east of Tilson Mill, 16 miles northeast of Marion, Nebo (T.V.A. 223-NW) Quadrangle, Va.

## PLATE 102

## OXOPLECTIA

- A. *Oxoplectia gibbosa* Cooper, new species..... 543  
 (1-5) Respectively brachial, side, anterior, pedicle, and posterior views,  $\times 1$ , of the holotype, 110860; (6) pedicle exterior,  $\times 2$ , of the holotype.  
 Ward Cove formation, Inskip, military coordinates E2, 604, 600-700/N596, 350, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.  
 (7-11) Respectively anterior, brachial, side, pedicle, and posterior views of a specimen younger than the holotype,  $\times 1$ , paratype, 110855c; (12-16) respectively brachial, anterior, side, posterior, and pedicle views of a specimen intermediate in size between the holotype and the preceding,  $\times 1$ , paratype, 110855a; (17) brachial exterior,  $\times 2$ , of the preceding.  
 Ward Cove formation, Hickey place, 2 miles southwest of Hall Crossroad, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.
- B. *Oxoplectia parva* Cooper, new species..... 552  
 (18-22) Respectively posterior, anterior, side, brachial, and pedicle views,  $\times 1$ , of the holotype, 117118; (23, 24) brachial and pedicle views,  $\times 2$ , of the holotype, showing ornamentation.  
 Benbolt formation (high), east bank of a sinkhole, 300 feet south of Lakeview Church, on Virginia Highway 71, Moll Creek (T.V.A. 196-SE) Quadrangle, Va.
- C. *Oxoplectia planiventra* Cooper, new species..... 554  
 (25-28) Respectively brachial, pedicle, side, and anterior views,  $\times 1$ , of the holotype, 117120; (29) pedicle side of holotype,  $\times 2$ , showing ornamentation.  
 Sevier formation (lower),  $\frac{1}{4}$  mile northeast of Miser, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.  
 (30-32) Respectively brachial, brachial tilted, and side views of another specimen,  $\times 2$ , paratype, 117121a.  
 Sevier formation,  $\frac{1}{4}$  mile north of Gooseneck, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.
- D. *Oxoplectia monitorensis* Cooper, new species..... 548  
 (33-37) Respectively brachial, anterior, side, posterior, and pedicle views,  $\times 1$ , of the holotype, 117111a.  
 Eureka group (yellow limestone on 25-foot sandstone at base), saddle just north of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.
- E. *Oxoplectia nevadensis* Cooper, new species..... 550  
 (38-42) Respectively brachial, side, anterior, posterior, and pedicle views of a complete specimen,  $\times 1$ , holotype, 117115a; (43) posterior of preceding,  $\times 2$ , showing interarea with nearly smooth pseudodeltidium; (44-48) respectively posterior, brachial, anterior, side, and pedicle views of another complete specimen,  $\times 1$ , paratype, 117115b; (49) brachial view,  $\times 2$ , of preceding.  
 Eureka group (dark gray shale under Eureka quartzite), north-facing nose of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.

PLATE 103

OXOPLECIA

Page  
542

A. *Oxoplecia filosa* Cooper, new species.....  
 (1-5) Respectively side, brachial, posterior, pedicle, and anterior views of a small complete specimen, X 1, paratype, 117099b; (12) enlargement, X 3, of the exterior surface of the anterior part of the pedicle valve of the preceding including most of the sulcus; (6-10) respectively posterior, brachial, anterior, pedicle, and side views of a large individual, X 1, holotype, 117099a; (11) posterior of the holotype, X 2, showing the interarea and the narrow elevated ridge on the pseudospondylium.

Bromide formation (Mountain Lake member), road cut on Oklahoma Highway 18, center NW¼ sec. 11, T. 1 S., R. 3 E., 1.8 miles south of Sulphur, Murray County, Okla.

B. *Oxoplecia marmorata* Cooper, new species.....  
 (13) Brachial exterior, X 2, paratype, 117110c; (14) pedicle exterior, X 2, holotype, 117110a; (15) another pedicle exterior, X 2, paratype, 117110b; (16) imperfect pedicle valve, X 2, paratype, 117110e.

Red Knobs formation, 1 mile south of Louisville, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.

C. *Oxoplecia gouldi* Ulrich and Cooper.....  
 (17-19) Respectively pedicle, posterior, and brachial views of a complete specimen, X 1, hypotype, 118010; (20-24) respectively anterior, posterior, brachial, pedicle, and side views of a well-preserved individual, X 1, hypotype, 110876; (25) pedicle exterior of same, X 2, showing fila crossing the costellae; (27) posterior view of the preceding, X 2, showing small apical foramen; (26) medial portion of a pedicle valve showing filose ornamentation superimposed on the costellae, X 4, paratype, 91898a; (28) the cardinal process seen from the anterior side, X 2, paratype, 91898b.

Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

(29) Apical view of an imperfect pedicle valve showing the foramen, the pseudodeltidium, and the narrow, elevated ridge, X 4, paratype, 91899.

Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), on branch of Hickory Creek, NW¼ sec. 26, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

PLATE 104

OXOPLECIA

556

A. *Oxoplecia recta* Cooper, new species.....  
 (1-5) Respectively anterior, posterior, pedicle, brachial, and side views of a somewhat weathered specimen, X 1, holotype, 110849a.

Lincolnshire formation (Hogskin member), Sally Cleveland Farm, ¾ mile southwest of Washburn, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.

(6) Posterior, showing ridge on pseudodeltidium, X 2, of a paratype, 117124.

Lincolnshire formation (Hogskin member), 0.4 mile northeast of Red Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.

B. *Oxoplecia eidsonensis* Cooper, new species.....  
 (7-11) Respectively posterior, brachial, anterior, pedicle, and side views, X 1, of the paratype, 110847a.

Lincolnshire formation, shaly beds, along old pasture road, ½ mile north of Eidson, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.

541

- |  | Page |
|--|------|
| C. <i>Oxoplecia pennsylvanica</i> Cooper, new species.....   | 553  |
| (12-16) Respectively brachial, anterior, pedicle, side, and posterior views of a complete specimen, $\times 1$ , holotype, 117119a; (17, 18) pedicle and brachial views, $\times 2$ , of the holotype; (19) posterior part of the holotype, $\times 3$ , showing interarea and pseudodeltidium.<br>Salona formation, old quarry 1 mile north-northeast of Bellefonte, Bellefonte (15') Quadrangle, Pa. |      |
| D. <i>Oxoplecia planulata</i> Cooper, new species.....   | 554  |
| (20-23) Respectively anterior, brachial, side, and pedicle views of a complete specimen, $\times 1$ , holotype, 117122; (24) posterior of preceding, $\times 2$ , showing interarea and pseudodeltidium.<br>Carters formation ( <i>Oxoplecia</i> bed), quarry 0.3 mile north of Gate City, Leeds (15') Quadrangle, Ala.  |      |
| E. <i>Oxoplecia plicata</i> Cooper, new species.....   | 555  |
| (25) Brachial exterior, $\times 1$ , holotype, 117123; (26-31) respectively pedicle, posterior, anterior, side, tilted to show interarea and pseudodeltidium and brachial views, $\times 2$ , of the holotype.<br>Red Knobs formation, $\frac{3}{4}$ mile east of Friendsville, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.   |      |
| F. <i>Oxoplecia eidsonensis</i> Cooper, new species.....   | 541  |
| (32-36) Respectively anterior, brachial, posterior, side, and pedicle views, $\times 1$ , of the holotype, 110847b; (37, 38) posterior and brachial views, $\times 2$ , of the holotype.<br>Lincolnshire formation (shaly part), on old pasture road, $\frac{1}{2}$ mile north of Eidson, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.   |      |
| G. <i>Oxoplecia abnormis</i> Cooper, new species.....  | 539  |
| (39) Brachial view, $\times 1$ , of the holotype, 110842; (40-44) respectively posterior, pedicle, anterior, brachial, and side views, $\times 2$ , of the holotype.<br>Effna formation, 1 mile east of Tilson Mill, 16 miles northeast of Marion, Nebo (T.V.A. 223-NW) Quadrangle, Va.  |      |

## PLATE 105

## OXOPLECTIA

- |  |     |
|--|-----|
| A. <i>Oxoplecia multicostellata</i> Cooper, new species.....   | 549 |
| (1-5) Respectively pedicle, anterior, brachial, posterior, and side views of a silicified specimen, $\times 1$ , paratype, 111791a; (15) posterior of the pedicle valve showing interarea, teeth, and pseudodeltidium, $\times 2$ , paratype, 111791f; (21, 22) interior and posterior of the brachial valve, $\times 3$ , showing brachial processes and cardinal process, paratype, 111791e; (20) pedicle interarea, $\times 3$ , showing teeth, pseudodeltidium, and small elevated ridge on the pseudodeltidium, paratype, 111791d. Note part of pseudodeltidium laid down anterior to the anterior end of the elevated ridge.<br>Chatham Hill formation, 1.2 miles S. 31° E. of Sharon Springs, Burkes Garden (15') Quadrangle, Va. |     |
| (6-9) Respectively side, posterior, pedicle, and brachial views of a complete specimen, $\times 1$ , holotype, 111790; (27) right umbonal side and lateral slope of brachial valve of holotype, enlarged $\times 4$ to show filose ornament.<br>Benbolt formation (lower), 0.2 mile south of the middle fork of Moccasin Creek, 1 $\frac{1}{2}$ miles south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.  |     |
| (10-13) Respectively anterior, pedicle, side, and brachial views of a large specimen, $\times 1$ , paratype, 117114a.  |     |

Benbolt formation (lower), north side of U. S. Highway 19, 1 $\frac{1}{4}$  miles south-east of Hansonville Post Office, Brumley (T.V.A. 205-SE) Quadrangle, Va.

(14) Pedicle valve,  $\times 2$ , showing interarea and pseudodeltidium, paratype, 117112.

Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Bland County, Va.

(16) Pedicle interior tilted to show dental plates, teeth, and edge of pseudodeltidium,  $\times 2$ , paratype, 117113e; (17, 18) respectively two views of the pedicle interior, one tilted to show the teeth and pseudodeltidium, the other to show the interarea,  $\times 2$ , paratype, 117113b; (19) interarea of the pedicle valve,  $\times 3$ , showing pseudodeltidium and narrow ridge characteristic of the Triplesiidae, paratype, 117113j; (23, 24) posterior and pedicle views of the brachial interior showing the cardinal process and brachial plates,  $\times 2$ , paratype, 117113a; (25) posterior view of the cardinal process showing myophore slits in each prong,  $\times 3$ , paratype, 117113c; (26) cardinal process seen from the inside and showing a brachial plate,  $\times 3$ , paratype, 117113h.

Chatham Hill formation, on Marion to Chatham Hill road, 6 miles north of Marion, Chatham Hill (T.V.A. 218-NE) Quadrangle, Va.

## PLATE 106

## CAMERELLA, OXOPLECIA, PARASTROPHINA, PORAMBONITES

- A. *Camerella* sp. 1..... 586  
 (1-5) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen,  $\times 1$ , figured specimen, 117149d.  
 Benbolt formation (lower), 0.1 to 0.2 mile north of the road, 1.1 miles north-east of Lee Valley, Lee Valley (T.V.A. 171-NW) Quadrangle, Tenn.
- B. *Oxoplecia globularis* Cooper, new species..... 544  
 (6-10) Respectively posterior, anterior, brachial, side, and pedicle views of a complete specimen,  $\times 1$ , holotype, 117098b; (11) side view of another specimen showing rotund profile,  $\times 1$ , paratype, 117098c.  
 Martinsburg formation (part with *Brongniartella* and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.
- C. *Oxoplecia parva* Cooper, new species..... 552  
 (12, 14, 15) Respectively pedicle, side, and brachial views of a complete specimen,  $\times 1$ , paratype, 117117a; (13, 16) pedicle and side views of another specimen slightly compressed laterally,  $\times 1$ , paratype, 117117b.  
 Benbolt formation (lower), 0.1 mile south of the middle fork of Moccasin Creek, 1 $\frac{1}{2}$  miles south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.
- D. *Porambonites* ? sp. 3..... 610  
 (17-19) Respectively exterior, side, and anterior views of a large pedicle valve,  $\times 5$ , figured specimen, 117178.  
 Pogonip group (*Orthidiella* zone), about 1 mile above the mouth of White-rock Canyon, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.  
 (20) Exterior of a pedicle valve,  $\times 6$ , figured specimen, 111371a; (24) interior,  $\times 5$ , of the preceding specimen; (23) same as preceding,  $\times 4$ , tilted to show dental plates; (21, 22) respectively two views of a brachial interior, tilted to show edges of brachiophore plates and in normal view,  $\times 4$ , figured specimen, 111371b.  
 Upper Pogonip group (*Orthidiella* or mottled zone 700 feet below the Eureka quartzite), near the base of the first ridge east of Frenchman Flat, Las Vegas (1°) Quadrangle, Nev.

	Page
E. <i>Oxoplecia multicostellata</i> Cooper, new species.....	549
(25, 26) Brachial and pedicle views of a complete specimen, $\times 1$ , paratype, 123334. Edinburg formation ( <i>Cyrtanotella</i> zone), Tumbling Run, $1\frac{1}{2}$ miles southwest of Strasburg, Strasburg (15') Quadrangle, Va.	
F. <i>Parastrophina</i> sp. 1.....	608
(27, 28) Brachial and pedicle views of a complete specimen, $\times 1$ , figured speci- men, 117169; (29-32) respectively anterior, side, pedicle, and brachial views, $\times 2$ , of the preceding. Horizon and locality same as B above.	
G. <i>Parastrophina hemiplicata</i> (Hall).....	606
(33-35) Respectively pedicle, side, and anterior views of a small individual, $\times 1$ , hypotype, 117168c; (36, 37) side and pedicle views, $\times 2$ , of the preceding; (38-42) respectively anterior, brachial, posterior, side, and pedicle views of a complete specimen, $\times 1$ , hypotype, 117168b; (43, 44) side and pedicle views, $\times 2$ , of the same hypotype. Horizon and locality same as B above.	
H. <i>Camerella bicostata</i> Cooper, new species.....	564
(45-49) Respectively brachial, anterior, side, pedicle, and posterior views of a complete specimen, $\times 1$ , holotype, 117130b; (50-54) respectively posterior, pedicle, anterior, side, and brachial views, $\times 2$ , of the holotype. Lincolnshire formation (Hogskin member), 0.4 mile east of Red Hill, $4\frac{1}{4}$ miles south-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.	

## PLATE 107

## PORAMBONITES, SALONIA

A. <i>Porambonites</i> ? sp. 2.....	610
(1, 3) Interior and exterior views of a pedicle valve, $\times 1$ , figured specimen, 117179; (2) pedicle interior of the same, $\times 1\frac{1}{2}$ , tilted to show edge of dental plates. Table Head series (lower), Table Point, Newfoundland.	
B. <i>Porambonites</i> ? <i>umbonatus</i> Cooper, new species.....	609
(4-8) Respectively pedicle, posterior, brachial, anterior, and side views of a com- plete specimen, $\times 1$ , holotype, 111373a; (9) enlargement, $\times 6$ , of the left poste- rior slope of the brachial valve of the holotype showing pitted ornament. Pogonip group (lower part of <i>Rhysostrophia</i> zone), Ikes Canyon about 1 mile above mouth, Toquima Range, Roberts Mountains (1°) Quadrangle, Nev. (10, 11) Exterior and interior of a pedicle valve tentatively referred to this species, $\times 2$ , figured specimen, 102310. Pogonip group (not far below Eureka quartzite), Nopah Range, Inyo County, Calif.	
C. <i>Porambonites</i> sp. 4.....	611
(12) Imperfect brachial valve, $\times 1$ , figured specimen, Columbia Univ. 26404 (1093); (13) same as the preceding, $\times 2$ ; (14) enlargement, $\times 4$ , of the surface on the right posterior side of the same specimen as preceding, showing pitted ornament. Salona formation, roadside and small quarry on Pennsylvania Highway 44, 150 yards east of road to Oriole, east of Antes Gap, Williamsport (15') Quad- rangle, Pa.	
D. <i>Salonia magnaplicata</i> Cooper and Whitcomb.....	615
(15-17) Respectively posterior, pedicle, and brachial views of a large specimen, $\times 2$ , holotype, 85422a; (18, 20) respectively pedicle and brachial views of a nearly full grown specimen, $\times 4$ , paratype, 85422b; (19) side view of a specimen	



smaller than the preceding,  $\times 4$ , paratype, 85422c; (21) brachial interior, ca.  $\times 6$ , showing cardinalia, paratype, 85422p.

Salona formation (12 feet above the base), along the railroad beside Fishing Creek, Salona, Clinton County, Lock Haven (15') Quadrangle, Pa.

## PLATE 108

CAMERELLA, GLYPTORTHIS, IDIOSPIRA, OXOPLECTIA, PERIMECOCOELIA,  
PORAMBONITES, TAPHRORTHIS

- |  | Page |
|--|------|
| A. <i>Glyptorthis glypta</i> Cooper, new species.....  | 369  |
| (1) Pedicle exterior, $\times 3$ , paratype, 116935c; (2, 3) respectively exterior and interior of a pedicle valve, $\times 4$ , showing muscle area and ornamentation, paratype, 116935a; (4, 5) exterior and interior of the brachial valve, showing cardinalia, $\times 4$ , paratype, 116935b.   |      |
| Pratt Ferry formation (lower third), 0.2 mile southeast of Pratt Ferry, 18 miles southwest of Montevallo, Blocton (15') Quadrangle, Ala.   |      |
| B. <i>Taphrorthis peculiaris</i> Cooper, new species.....  | 328  |
| (6-10) Respectively pedicle, posterior, anterior, side, and brachial views of a young but complete specimen, $\times 4$ , paratype, 116893b; (11) brachial view of a complete specimen, $\times 4$ , paratype, 116893a; (12, 13) respectively pedicle and brachial interiors, $\times 4$ , of same paratype; (14) pedicle exterior, $\times 4$ , of the same paratype.   |      |
| Horizon and locality same as preceding.  |      |
| C. <i>Glyptorthis equiconvexa</i> Cooper, new species.....   | 368  |
| (15, 16) Respectively $\times 2$ and $\times 1$ views of the brachial interior, showing the cardinalia, paratype, 116933b; (17, 18) respectively $\times 1$ and $\times 2$ views of the pedicle interior showing the narrow diductor tracks and the broad adductor track, paratype, 116933a.   |      |
| Botetourt formation, in the field on the south side of the road 0.2 mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.   |      |
| D. <i>Taphrorthis peculiaris</i> Cooper, new species.....  | 328  |
| (19, 20) Brachial and pedicle views of a somewhat crushed specimen, $\times 1$ , paratype, 116892.   |      |
| Botetourt formation, north side of Virginia Highway 114, 2.3 miles west of the Montgomery-Roanoke County line, 12 miles northeast of Blacksburg, Va.   |      |
| E. <i>Perimecocoelia semicostata</i> Cooper, new species.....  | 594  |
| (21) Spondylium of the pedicle valve showing an anterior constriction common to old-age specimens, $\times 4$ , paratype, 117159d; (22) another fragmentary pedicle valve showing the spondylium, in this case without constriction, $\times 3$ , paratype, 117159c; (23, 24) brachial interior in normal view and tilted to show the elongated cruralium from which the genus derives its name, $\times 2$ , holotype, 117159b; (25) incomplete brachial valve seen from the side to show the elongated cruralium and fulcral plates, $\times 3$ , paratype, 117159a. |      |
| Horizon and locality same as A above.  |      |
| F. <i>Idiospira panderi</i> (Billings).....  | 691  |
| (26-30) Respectively brachial, pedicle, posterior, side, and anterior views of a complete specimen, $\times 1$ , hypotype, 92374a; (31) brachial interior showing cardinalia, $\times 2$ , hypotype, 85330a; (32) specimen with brachial valve removed to show peculiar brachidium, $\times 2$ , hypotype, 92374c.   |      |
| Rockland formation, Pauquette Rapids, Ottawa River, Ontario, Canada.   |      |
| G. <i>Camerella umbonata</i> Cooper, new species.....  | 582  |
| (33, 34) Pedicle and brachial views of the holotype, $\times 1$ , 117147; (35-39) respectively anterior, side, pedicle, posterior, and brachial views of the holotype, $\times 2$ .  |      |

	Page
Yellow limestone on 25-foot sandstone at base of Eureka group, 3½ miles N. 17° E. of Martin Ranch, Roberts Mountains (1°) Quadrangle, Nev.	
H. <i>Porambonites</i> ? sp. 1.....	609
(40, 41) Exterior and interior of the pedicle valve, × 1, showing spondylium and short septum, figured specimen, 117177; (42) exterior of the same specimen, × 2, showing pitted ornamentation.	
Pogonip group, hills on the west side of Racetrack Valley, opposite Quartz Spring, Uhebe Peak (15') Quadrangle, Inyo County, Calif.	
I. <i>Oxoplecia magnaplicata</i> Cooper, new species.....	546
(43-47) Respectively brachial, anterior, posterior, pedicle, and side views of an adult complete specimen, × 1, holotype, 117109; (48) brachial view of the preceding specimen, × 2, showing interarea and small ridge on pseudodeltidium.	
Shippensburg formation (Pinesburg member— <i>Echinosphaerites</i> zone), cut at Wilson on U. S. Highway 40 on the west side of Conococheague Creek, 7 miles west of Hagerstown, Williamsport (15') Quadrangle, Md.	

## PLATE 109

## CAMERELLA, IDIOSTROPHIA, RHYSOSTROPHIA

A. <i>Idiostrophia perfecta</i> Ulrich and Cooper.....	589
(1-3) Respectively brachial, side, and pedicle views of a small specimen referred to this species, × 2, hypotype, 117173.	
Table Head series (middle to upper half), 2½ to 3 miles south of Belle Burns, Newfoundland.	
(4-8) Respectively posterior, anterior, side, pedicle, and brachial views of a fine, large specimen, × 1½, holotype, 92885a.	
Boulder in Mystic conglomerate, Range 6, Lot 20, Stanbridge Township, near Mystic, Quebec, Canada.	
B. <i>Idiostrophia costata</i> Ulrich and Cooper.....	588
(9-13) Respectively pedicle, anterior, side, posterior, and brachial views of a complete specimen, × 1½, holotype, 92886.	
Horizon and locality same as preceding (figs. 4-8).	
C. <i>Idiostrophia plicata</i> Cooper, new species.....	589
(14-17) Respectively brachial, anterior, pedicle, and side views, × 2, of the holotype, 117172.	
Table Head series, Table Point, Newfoundland.	
D. <i>Idiostrophia paucicostata</i> Cooper, new species.....	588
(18-20) Respectively pedicle, side, and brachial views of sparsely plicated individual, × 2, holotype, 117171.	
Upper Pogonip group (sponge beds), Ikes Canyon, about ¾ mile above the mouth, Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.	
E. <i>Idiostrophia nuda</i> Cooper, new species.....	588
(21-25) Respectively brachial, pedicle, posterior, anterior, and side views, × 1, of the holotype, 117170; (26-29) respectively posterior, anterior, pedicle, and side views of the holotype, × 2, showing the ornamentation.	
Pogonip group (mottled zone 700 feet below the Eureka quartzite), base of the first ridge east of Frenchman Flat, Las Vegas (1°) Quadrangle, Nev.	
F. <i>Rhysostrophia transversa</i> Ulrich and Cooper.....	559
(30, 31) Exterior of pedicle and brachial valves, × 2, respectively lectotype, 91175b, and paratype, 91175a.	
Mystic conglomerate, Range 6, Lot 20, Stanbridge Township, near Mystic, Quebec, Canada.	

- Page  
578
- G. *Camerella ? primigenia* (Bradley).....  
 (32, 33) Side and exterior views of a pedicle valve,  $\times 1$ , hypotype, 111175b;  
 (34, 35) exterior and side views of a brachial valve,  $\times 1$ , hypotype, 111175a;  
 (36-38) pedicle, side, and brachial views of a small, nearly complete specimen,  
 $\times 2$ , hypotype, 111177.  
 Kimmswick formation (12 to 14 feet above the Izard limestone),  $2\frac{1}{2}$  miles  
 above the mouth of Cave Creek, about 7 to 8 miles north of Batesville,  
 Batesville (30') Quadrangle, Ark.

## PLATE 110

## CAMERELLA, LIRICAMERA

- A. *Camerella immatura* Cooper, new species..... 570  
 (1-4) Respectively side, anterior, pedicle, and brachial views,  $\times 2$ , of the holo-  
 type, 117137; (5) brachial view,  $\times 1$ , of the holotype.  
 Chatham Hill formation, Grayson Farm, 4 to 5 miles southeast of Bland,  
 Bland County, Va.
- B. *Camerella varians* Billings..... 583  
 (6, 7) Respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle valve of a narrow  
 specimen, paratype, G.S.C. 1038a.  
 Mingan formation, Mingan Islands, St. Lawrence River, Canada.
- C. *Camerella volborthi* Billings..... 585  
 (8-11) Respectively anterior, pedicle, brachial, and side views of a complete speci-  
 men,  $\times 1$ , hypotype, G.S.C. (not numbered).  
 Rockland formation, Paquette Rapids, Ottawa River, Quebec, Canada.
- D. *Camerella varians* Billings..... 583  
 (12-15) Respectively pedicle, brachial, and side views of a wide individual,  $\times 1$ ,  
 lectotype, G.S.C. 1038; (15) pedicle view of lectotype,  $\times 2$ .  
 Horizon and locality same as B above.
- E. *Camerella varians* Billings..... 583  
 (16-18) Respectively pedicle, anterior, and brachial views of a complete specimen,  
 $\times 1$ , hypotype, 111163; (19-21) pedicle, brachial, and side views,  $\times 2$ , of the  
 preceding.  
 Crown Point formation, Valcour Island, Lake Champlain, Plattsburg (15')  
 Quadrangle, N. Y.
- F. *Camerella triangulata* Cooper, new species..... 581  
 (22-25, 29) Respectively pedicle, anterior, side, brachial, and posterior views of  
 a complete specimen,  $\times 1$ , holotype, 111162; (26-28, 30) respectively anterior,  
 brachial, side, and pedicle views,  $\times 2$ , of the preceding.  
 Lenoir formation, Knoxville, Tenn.  
 (31-35) Respectively anterior, side, posterior, pedicle, and brachial views of a  
 complete specimen,  $\times 2$ , paratype, 117145.  
 Lenoir formation (*Billingsaria* zone),  $\frac{3}{4}$  mile northeast of Friendsville, Louis-  
 ville (T.V.A. 138-SE) Quadrangle, Tenn.
- G. *Camerella ventricosa* Cooper, new species..... 584  
 (36-40) Respectively brachial, side, pedicle, posterior, and anterior views of a  
 large, rotund individual,  $\times 1$ , holotype, 111170a; (41-45) respectively brachial,  
 posterior, side, anterior, and pedicle views,  $\times 2$ , of the preceding; (46-49) re-  
 spectively side, anterior, posterior, and brachial views of an individual narrower  
 than the preceding,  $\times 1$ , paratype, 111170d.  
 Crown Point formation (loose but derived from zone 3, division B of Brainerd  
 and Seeley), Chazy, Plattsburg (15') Quadrangle, N. Y.

H. <i>Liricamera nevadensis</i> Cooper, new species.....	Page 592
(50-54) Respectively brachial, posterior, side, pedicle, and anterior views of a small but complete specimen, $\times 2$ , paratype, 117175c; (55) pedicle exterior, $\times 1$ , paratype, 117175h; (56) pedicle view of an imperfect specimen, $\times 2$ , paratype, 117175b; (57) brachial interior showing small characteristic cruralium, $\times 2$ , paratype, 117175d.	
Pogonip group ( <i>Orthidiella</i> zone—mottled zone 700 feet below the Eureka quartzite), base of first ridge east of Frenchman Flat, Las Vegas (1°) Quadrangle, Nev.	

PLATE III

CAMERELLA, PERIMECOCOELIA, STENOCAMARA

A. <i>Camerella bicostata</i> Cooper, new species.....	564
(1-5) Respectively brachial, posterior, side, anterior, and pedicle views of a young specimen, $\times 1$ , paratype, 111106; (11-15) respectively pedicle, anterior, side, posterior, and brachial views of an obese and slightly crushed specimen, $\times 1$ , paratype, 117130a.	
Lincolnshire formation (Hogskin member—upper), 0.4 mile northeast of Red Hill, 4¼ miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.	
(6-10) Respectively brachial, posterior, anterior, pedicle, and side views of another complete specimen, $\times 1$ , paratype, 111110a.	
Lincolnshire formation (Hogskin member), Sally Cleveland Farm, ¾ mile southwest of Washburn, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.	
B. <i>Camerella quadruplicata</i> (Willard).....	579
(16, 17) Pedicle and anterior views of a small specimen, $\times 1$ , hypotype, 111155b.	
Horizon and locality same as preceding.	
(18-20) Respectively brachial, pedicle, and side views of a slightly broken specimen, $\times 1$ , hypotype, 118011a; (21) brachial view, $\times 2$ , of the preceding. The hole in the center of the specimen was broken in taking the $\times 2$ enlargement.	
Horizon and locality same as A (1-5) above.	
(22-24) Respectively pedicle, anterior, and brachial views of a weathered specimen, $\times 1$ , hypotype, 111157a; (26) enlargement of the surface, $\times 4$ , showing fine papillae, hypotype, 111157c.	
Lincolnshire formation (Hogskin member), 2.1 miles southwest of Mount Eager Church, Hogskin Valley, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.	
(25) Brachial exterior, $\times 1$ , hypotype, 111156a.	
Lincolnshire formation near Marble Bluff, 8 miles west-northwest of Loudon, Loudon (30') Quadrangle, Tenn.	
C. <i>Perimecocoelia elliptica</i> Cooper, new species.....	594
(27-30) Respectively brachial, anterior, pedicle, and posterior views, $\times 1$ , of the holotype, 111164; (31-35) respectively posterior, brachial, side, pedicle, and anterior views, $\times 2$ , of the holotype.	
Arline formation, north side of old wagon road in cedar glade, ¼ mile south-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
D. <i>Camerella tumida</i> Cooper, new species.....	582
(36-40) Respectively pedicle, anterior, posterior, brachial, and side views of a complete specimen, $\times 2$ , holotype, 117146.	
Table Head series (middle to lower), Lower Head, 4 miles north of Cow Head, Newfoundland.	
E. <i>Stenocamara perplexa</i> Cooper, new species.....	603
(41-45) Respectively side, anterior, pedicle, posterior, and brachial views of a complete specimen, $\times 1$ , holotype, 111321.	

Mosheim formation,  $\frac{1}{2}$  mile southeast of railroad station, Morrilstown, Morrilstown (T.V.A. 163-NE) Quadrangle, Tenn.

- F. *Camerella anteroplicata* Cooper, new species..... 562  
 (46-49) Respectively pedicle, anterior, brachial, and side views,  $\times 1$ , of the holotype, 117129; (50-54) respectively anterior, posterior, side, brachial, and pedicle views,  $\times 2$ , of the holotype.  
 Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.
- G. *Camerella* cf. *C. anteroplicata* Cooper, new species..... 562  
 (55-58) Respectively brachial, anterior, pedicle, and posterior views of a small specimen,  $\times 1$ , figured specimen, 111341; (59-63) respectively anterior, pedicle, side, brachial, and posterior views,  $\times 2$ , of the preceding.  
 Horizon and locality same as preceding.

## PLATE 112

## CAMERELLA, RHYSOSTROPHIA

- A. *Rhysostrophia* sp. 2..... 560  
 (1, 2) Brachial and pedicle exteriors,  $\times 2$ , figured specimens, 117162a, 117162b.  
 Table Head series (upper), Table Point, Newfoundland.
- B. *Rhysostrophia occidentalis* Ulrich and Cooper..... 559  
 (3-7) Respectively anterior, posterior, side, brachial, and pedicle views of an exceptionally fine specimen,  $\times 1$ , hypotype, 117163.  
 Upper Pogonip group (lower part of *Rhysostrophia* zone), about 1 mile above the mouth of Ikes Canyon, Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.
- C. *Camerella bella* Fenton..... 563  
 (8, 9) Pedicle exterior and interior,  $\times 1$ , hypotype, 111101m; (10, 11) brachial exterior and interior,  $\times 1$ , hypotype, 111101k; (14) interior view,  $\times 1$ , of the preceding tipped to show cruralium and median septum; (15) same view,  $\times 2$ , of same specimen.  
 Plattin group (Macy formation), Heck place, 1 $\frac{1}{4}$  miles south-southeast of River Aux Vasses, Weingarten (15') Quadrangle, Mo.  
 (12, 13) Pedicle interior,  $\times 1$  and  $\times 2$ , showing spondylium in detail, hypotype, 111102a.  
 Plattin group (Macy formation), on old road 1 mile northwest of the Chicago Summer School Camp, NW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 32, T. 37 N., R. 9 E., Weingarten (15') Quadrangle, Mo.
- D. *Camerella indefinita* Cooper, new species..... 570  
 (16-20) Respectively pedicle, anterior, posterior, brachial, and side views,  $\times 1$ , of the holotype,  $\times 1$ , 111127; (21-22) brachial and pedicle views,  $\times 2$ , of the holotype.  
 Elway formation,  $\frac{1}{2}$  mile northwest of Eidson, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.
- E. *Camerella multiplicata* Cooper, new species..... 572  
 (23-27) Respectively anterior, posterior, brachial, pedicle, and side views,  $\times 1$ , of the holotype, 111153; (28, 29) pedicle and brachial views,  $\times 2$ , of the holotype.  
 Horizon and locality same as preceding.
- F. *Camerella* sp. 2..... 586  
 (30, 32, 33) Respectively anterior, side, and pedicle views of a somewhat distorted specimen,  $\times 2$ , figured specimen, 117150a; (31) pedicle view of an immature individual before developing anterior costation,  $\times 2$ , figured specimen, 117150b.  
 Blackford formation (basal conglomerate zone), just north of the junction

	Page
of Virginia Highways 100 and 42 on Virginia 100, Staffordsville, Giles County, Va.	
G. <i>Camerella costellata</i> Cooper, new species.....	565
(34-36) Exterior, anterior, and side views of the pedicle interior impression, × 1, paratype, I11113a; (37, 38) posterior and pedicle views of the same specimen, × 2, showing slots produced by spondylium and median septum; (40) impression of the brachial interior, × 1, paratype, I11113b; (39, 41) posterior and normal views of the same brachial impression, × 2, showing slots formed by cruralium and median septum.	
Elway formation, Eggleston, Giles County, Va.	

PLATE 113

CAMERELLA, IDIOSTROPHIA

A. <i>Idiostrophia</i> ? sp. 1.....	590
(1-4) Respectively side, pedicle, brachial, and anterior views of a complete specimen, × 3, figured specimen, 66308a; (5) brachial view of a specimen smaller than the preceding, × 3, figured specimen, 66308b.	
Boulder in the Mystic conglomerate, Range 6, Lot 20, Stanbridge Township, Quebec, Canada.	
B. <i>Camerella unicostata</i> Cooper, new species.....	583
(6-9) Respectively brachial, anterior, side, and pedicle views, × 3, of the holotype, I11161.	
Ward Cove formation, 2 miles south of Hall Crossroad on the Hickey place, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.	
C. <i>Camerella minuta</i> Cooper, new species.....	571
(10-14) Respectively posterior, brachial, pedicle, side, and anterior views, × 3, of the holotype, I11131a.	
Botetourt formation, near Cedar Grove Church and School, 1½ miles southeast of Harrisonburg, Harrisonburg (15') Quadrangle, Va.	
(15-19) Respectively pedicle, side, brachial, anterior, and posterior views of a complete specimen, × 3, paratype, I11128e.	
Effna formation, lower part of McNutt Quarry, 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.	
D. <i>Camerella gregeri</i> Cooper, new species.....	569
(20-24) Respectively posterior, anterior, side, pedicle, and brachial views of a fine complete specimen with 4 costae in the sulcus, × 1, paratype, I11125; (25-29) respectively brachial, posterior, pedicle, anterior, and side views of a large specimen with 6 costae in the sulcus, × 1, holotype, I11126.	
Plattin group (Macy formation), near Glencoe, St. Louis County, Mo.	
(30) Pedicle interior, showing spondylium, × 1, paratype, I17136a; (31) brachial interior showing cruralium, × 2, paratype, I17136c.	
Plattin group (Macy formation), Rockwoods Reservation, 1 mile west of Grover, 20 miles west of St. Louis on Manchester Road, St. Louis County, Mo.	
E. <i>Camerella elliptica</i> Cooper, new species.....	567
(32-34) Brachial, pedicle, and side views of a young specimen, × 1, paratype, 98220a; (35-39) respectively brachial, pedicle, anterior, side, and posterior views, × 1, of the holotype, I1119d; (40, 41) respectively × 1 and × 2 enlargements of the pedicle interior showing the spondylium, paratype, I1119c; (42, 43) respectively × 2 and × 3 views of the posterior of a specimen seen from the anterior and showing the spondylium, cruralium, and long, thin brachial process, paratype, I1119b.	
Lincolnshire formation, Marcem Quarry, north side of U. S. Highway 58, 2 miles west of Gate City, Gate City (T.V.A. 188-NE) Quadrangle, Va.	

- F. *Camerella* cf. *C. elliptica* Cooper, new species..... Page  
567  
(44-48) Respectively pedicle, anterior, side, posterior, and brachial views of a complete specimen,  $\times 1$ , figured specimen, 117133a.  
Lincolnshire formation, on the north side of the road 2 miles southwest of Hall Crossroad, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.

## PLATE 114

## CAMERELLA, PERIMECOCOELIA

- A. *Camerella plicata* (Schuchert and Cooper)..... 577  
(1-5) Respectively side, pedicle, anterior, posterior, and brachial views of a complete specimen,  $\times 1$ , hypotype, 111147c; (21, 22) brachial interior,  $\times 1$ , and the same specimen tilted to show cruralium and septum,  $\times 2$ , hypotype, 111147b; (23, 24) enlargements  $\times 1$  and  $\times 2$  of the pedicle interior showing the spondylium and septum, hypotype, 111147a.  
Ridley formation (top of lower third), east side of Marshall Knobs, 5 miles south of Murfreesboro, Rutherford County, Tenn.  
(6-10) Respectively pedicle, anterior, side, posterior, and brachial views of a complete specimen,  $\times 2$ , paratype, 111139d; (11-15) respectively posterior, pedicle, side, anterior, and brachial views of a wide specimen with numerous costae,  $\times 1$ , paratype, 111139g; (16-20) respectively anterior, pedicle, side, posterior, and brachial views,  $\times 2$ , of the preceding.  
Wardell formation (*Hesperorthis* zone), Evans Ferry section, road cut on U. S. Highway 25E,  $\frac{1}{2}$  mile north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.
- B. *Camerella pulchra* Cooper, new species..... 578  
(25-29) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen,  $\times 1$ , paratype, 118012; (30-34) respectively anterior, side, posterior, pedicle, and brachial views,  $\times 2$ , of the same specimen.  
Horizon and locality same as A, figs. 1-5, above.
- C. *Perimecocoelia semicostata* Cooper, new species..... 594  
(35-38) Respectively side, pedicle, anterior, and brachial views of a complete specimen,  $\times 2$ , paratype, 117161.  
Benbolt formation, south side of Mount Hagan School, Hilton (T.V.A. 197-NW) Quadrangle, Va.
- D. *Camerella* ? *leiorhynchoidea* Cooper, new species..... 571  
(39) Somewhat crushed pedicle valve,  $\times 2$ , paratype, 117138b; (40) brachial valve,  $\times 2$ , paratype, 117138d; (41) a somewhat smaller brachial valve than the preceding,  $\times 2$ , paratype, 117138c; (42, 43) pedicle exterior,  $\times 1$  and  $\times 2$ , holotype, 117138a.  
Edinburg formation (Liberty Hall facies—just below the siltstone band with *Paucicrura*), road cut on U. S. Highway 33, between Peales Crossroads and Penn Laird, Harrisonburg (15') Quadrangle, Va.

## PLATE 115

## CAMERELLA, PARALLELELASMA, STENOCAMARA

- A. *Camerella perplexa* Cooper, new species..... 576  
(1-4) Respectively brachial, anterior, pedicle, and side views of a complete specimen,  $\times 1$ , holotype, 117143; (5) brachial view,  $\times 2$ , of the preceding.  
Elway formation (*Dinorthis holdeni* beds), east of Moccasin Creek on County Highway 679,  $\frac{3}{4}$  mile south of Tumbez, Moll Creek (T.V.A. 196-SE) Quadrangle, Va.

	Page
B. <i>Camerella</i> cf. <i>C. perplexa</i> Cooper, new species.....	576
(6-9) Respectively brachial, pedicle, anterior, and side views of a complete specimen, $\times 1$ , figured specimen, 111123; (10, 11) pedicle and brachial views, $\times 2$ , of the preceding specimen.	
Elway formation (35 to 55 feet above the base of the section), $\frac{1}{2}$ mile northwest of Eidson, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.	
C. <i>Camerella nuda</i> Cooper, new species.....	573
(12-16) Respectively posterior, side, anterior, brachial, and pedicle views of a young specimen, $\times 3$ , in which the anterior costae are not fully formed, paratype, 117139b; (17-21) respectively pedicle, anterior, side, posterior, and brachial views of an adult, $\times 3$ , holotype, 117139a.	
Murfreesboro formation, on Stone River at crossing with U. S. Highway 70S, $1\frac{1}{2}$ miles northwest of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.	
D. <i>Camerella tennesseensis</i> Cooper, new species.....	580
(22-26) Respectively posterior, pedicle, anterior, brachial, and side views, $\times 1$ , of the holotype, 111160; (27-31) respectively posterior, pedicle, anterior, side, and brachial views, $\times 2$ , of the holotype.	
Arline formation (middle), north side of old road in cedar glade, $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
E. <i>Camerella breviplicata</i> Billings.....	565
(32-34) Pedicle, side, and brachial views, $\times 2$ , of the holotype, G.S.C. 759.	
Boulder in Mystic conglomerate, Range 6, Lot 20, Stanbridge Township, near Mystic, Quebec, Canada.	
F. <i>Camerella edmundsoni</i> Cooper, new species.....	566
(35, 36) Respectively $\times 1$ and $\times 2$ enlargements of a pedicle exterior, paratype, 111117e; (37, 38) enlargements, $\times 1$ and $\times 2$ , of the pedicle interior showing the spondylium, holotype, 111117b; (39) exterior of the brachial valve, $\times 1$ , paratype, 111117c; (40) interior of the brachial valve showing cruralium, $\times 3$ , paratype, 111117d; (41, 42) enlargements, $\times 1$ and $\times 2$ , of the brachial interior, paratype, 111117a.	
Poteet formation (Yellow Branch member), on the road beside Yellow Branch, 5 miles southeast of Rose Hill, Rose Hill (T.V.A. 161-NE) Quadrangle, Va.	
G. <i>Stenocamara bicostata</i> Cooper, new species.....	603
(43) Brachial view, $\times 1$ , of the holotype, 111317; (44-48) respectively pedicle, anterior, brachial, side, and posterior views, $\times 2$ , of the holotype.	
Mosheim formation, $\frac{1}{2}$ mile east of Odenville, Springville (30') Quadrangle, Ala.	
H. <i>Parallelasma pentagonum</i> Cooper, new species.....	614
(49) A large brachial valve, $\times 1$ , paratype, 111329.	
Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
I. <i>Camerella edmundsoni</i> Cooper, new species.....	566
(50) Brachial exterior, $\times 1$ , paratype, 117132b; (51) pedicle exterior, $\times 1$ , paratype, 117132a; (52) interior of the preceding, $\times 2$ , showing the spondylium.	
Horizon and locality same as F above.	

PLATE 116

CAMERELLA

A. <i>Camerella volborathi</i> Billings.....	585
(1-5) Respectively pedicle, anterior, side, posterior, and brachial views of a large specimen, $\times 1$ , hypotype, 117148a.	



	Page
Rockland formation (Cloche Island member), south of Helen Lake, LaCloche Island, Manitoulin District, Ontario, Canada.	
B. <i>Camerella globularis</i> Cooper, new species.....	568
(6-9) Respectively brachial, pedicle, side, and posterior views of a strongly costate specimen, $\times 1$ , paratype, 98192a; (10-14) respectively anterior, side, posterior, brachial, and pedicle views of a specimen smaller than the preceding, $\times 1$ , paratype, 98192b; (15, 16) same specimen as preceding, $\times 2$ .	
Whistle Creek formation, on Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.	
(17-20) Respectively brachial, anterior, side, and pedicle views of a large specimen, $\times 1$ , holotype, 117134.	
Whistle Creek formation, road cut on U. S. Highway 60, 100 yards southeast of Whistle Creek, 1½ to 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.	
C. <i>Camerella</i> cf. <i>C. globularis</i> Cooper, new species.....	568
(21-24) Respectively side, brachial, anterior, and pedicle views of a complete specimen, $\times 1$ , figured specimen, 117135.	
Horizon and locality same as preceding.	
D. <i>Camerella obesa</i> Cooper, new species.....	574
(25-29) Respectively brachial, posterior, side, pedicle, and anterior views of a complete specimen, $\times 1$ , holotype, 117140a; (30-34) respectively pedicle, side, anterior, brachial, and posterior views, $\times 2$ , of the same specimen.	
Rockland formation, Mill Creek, Turin, Port Leyden (15') Quadrangle, N. Y.	
E. <i>Camerella pulchra</i> Cooper, new species.....	578
(35-39) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen, $\times 2$ , paratype, 85340a.	
Ridley formation, C. St. L. and N. RR., 3 miles northwest of Murfreesboro, Rutherford County, Tenn.	
F. <i>Camerella pulchra</i> Cooper, new species.....	578
(40) Brachial view of the exterior of a specimen with 4 costae in the fold, $\times 1$ , paratype, 111146c; (41) brachial view of a specimen with 2 costae in fold, $\times 1$ , paratype, 111146b; (42, 43, 45) respectively posterior, brachial, and side views of another specimen with 3 costae on fold, $\times 2$ , holotype, 111146a; (44) anterior view, $\times 2$ , of specimen with 4 costae on fold, same specimen as fig. 40; (46) pedicle view, $\times 2$ , of a specimen with 2 costae in sulcus, same specimen as fig. 41.	
Ridley formation, 3½ miles northwest of Murfreesboro, Rutherford County, Tenn.	

## PLATE 117

## CAMERELLA, PARASTROPHINA, PERIMECOCOELIA

A. <i>Parastrophina rotundiformis</i> (Willard).....	607
(1, 2) Respectively $\times 1$ and $\times 3$ enlargements of the posterior part of a complete specimen showing the spondylium and cardinalia, hypotype, 87600.	
Prosser formation ( <i>Prasopora</i> bed), 1½ miles north of Waukon, Allamakee County, Iowa.	
B. <i>Perimecocoelia triangulata</i> Cooper, new species.....	596
(3-7) Respectively anterior, side, posterior, brachial, and pedicle views, $\times 1$ , of the holotype, 111342a; (8-12) respectively anterior, side, posterior, brachial, and pedicle views, $\times 2$ , of the holotype.	
Effna formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 219-NW) Quadrangle, Va.	

- |   | Page |
|---|------|
| C. <i>Camerella</i> sp. 3.....  | 586  |
| (13-17) Respectively posterior, anterior, side, brachial, and pedicle views, $\times 2$ , of the figured specimen, 117151; (18) brachial view, $\times 1$ , of same.  |      |
| Eureka group (yellow beds above 25-foot sandstone), in saddle just north of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.  |      |
| D. <i>Parastrophina hemiplicata</i> (Hall).....   | 606  |
| (19-23) Respectively brachial, side, pedicle, anterior, and posterior views of a complete specimen, $\times 1$ , hypotype, 117168a.   |      |
| Martinsburg formation (part with <i>Brongniartella</i> and referable to Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.  |      |
| (24-27) Respectively brachial, side, anterior, and pedicle views of another complete specimen, $\times 1$ , hypotype, 111324.   |      |
| Martinsburg formation (part with <i>Brongniartella</i> and referable to Salona formation), about 14 miles northwest of Staunton, Va.  |      |
| E. <i>Perimecocoelia semicostata</i> Cooper, new species.....   | 594  |
| (28-32) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen, $\times 1$ , paratype, 111333b; (33-37) brachial, posterior, side, anterior, and pedicle views, $\times 2$ , of the preceding specimen; (43-45) respectively pedicle, side, and brachial views of a young specimen, $\times 1$ , paratype, 111336b; (46-50) respectively posterior, anterior, side, pedicle, and brachial views of a small specimen, $\times 1$ , paratype, 111334b.        |      |
| Effna formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.  |      |
| (38-42) Respectively brachial, pedicle, anterior, side, and posterior views, $\times 1$ , of a paratype, 111338.  |      |
| Effna formation, Tilson Mill, 16 miles northeast of Marion, Va.   |      |
| (51) Brachial interior showing elongate cruralium, $\times 4$ , paratype, 111347a.  |      |
| Edinburg formation (base of Liberty Hall facies), 1.8 miles S. 4° W. of Bethel Church, 5.9 miles due east of Harrisonburg, Harrisonburg (15') Quadrangle, Va.   |      |
| F. <i>Perimecocoelia semicostata</i> Cooper, new species.....   | 594  |
| (52, 53) Respectively $\times 1$ and $\times 2$ enlargements of a pedicle valve, paratype, 118013b; (54) another pedicle valve, $\times 1$ , paratype, 118013d; (55, 56) exterior and side view, $\times 1$ , of brachial valve, paratype, 118013c; (57) brachial exterior, $\times 2$ , paratype, 118013f; (58, 59) respectively brachial interior in normal view and tilted, showing elongate cruralium and adductor muscle scars on each side of the septum, $\times 2$ , paratype, 111328e. |      |
| Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.  |      |

## PLATE 118

## BREVICAMERA, CAMERELLA, PARALLELELASMA, PARASTROPHINA

- |   |     |
|---|-----|
| A. <i>Brevicamera camerata</i> Cooper, new species.....   | 561 |
| (1-4) Side, anterior, exterior, and interior views of the pedicle valve, $\times 2$ , paratype, 117154a; (5-7) exterior, side, and interior views of the brachial valve, $\times 2$ , paratype, 117154b; (8, 9) brachial interior tilted and in normal view, $\times 3$ , showing sessile cruralium and cardinalia of the same paratype; (10) cruralium, ca. $\times 4$ . |     |
| Pratt Ferry formation (about 3 feet above the base), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.  |     |

- |   | Page |
|---|------|
| B. <i>Parallelelasma pentagonum</i> Cooper, new species.....  | 614  |
| (11, 12) Exterior and side views of the brachial valve with outline of exterior restored, $\times 2$ , paratype, 117155b; (13) fragment of the pedicle valve preserving the spondylium and teeth, $\times 6$ , paratype, 117155f; (14) another pedicle fragment showing the spondylium and the median septum, ca. $\times 5$ , paratype, 117155c; (15) the preceding specimen, $\times 3$ , in another position; (16, 17) fragment of the brachial interior in normal view and tilted to the side to show the long brachiophore plates, $\times 3$ , paratype, 117155e; (18, 19) normal and side views of another brachial interior showing the elongated plates, $\times 3$ , paratype, 117155g. Horizon and locality same as preceding.   |      |
| C. <i>Camerella costellata</i> Cooper, new species.....   | 565  |
| (20-24) Respectively posterior, anterior, side, pedicle, and brachial views, $\times 1$ , of the holotype, 117131; (25-29) respectively posterior, side, anterior, brachial, and pedicle views, $\times 2$ , of the holotype.<br>Elway formation (near top), $\frac{3}{4}$ mile southwest of Mount Eager Church and 0.2 mile northwest of the road along a farm lane, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.  |      |
| D. <i>Parastrophina bilobata</i> Cooper, new species.....   | 605  |
| (30-33) Respectively exterior, side, anterior, and interior views, of the pedicle valve, $\times 3$ , paratype 117166c; (34) interior of another pedicle valve showing the spondylium and septum, $\times 3$ , paratype, 117166d; (35, 36, 38) side, exterior, and interior of a brachial valve, $\times 3$ , paratype, 117166h; (37) exterior of another brachial valve, $\times 3$ , paratype, 117166j; (39) brachial interior, $\times 4$ , showing the cruralium and alate plates, paratype, 117166a; (40) interior of an old and thickened brachial valve, $\times 3$ , paratype, 117166e; (41) cardinalia of the preceding specimen enlarged $\times 6$ , showing alate plates and deposits on the side of the cruralium; (42, 43) respectively ca. $\times 8$ and $\times 4$ views of the cardinalia showing the cruralium, septum, and alate plates, paratype, 117166f; (44) another brachial interior showing alate plates, $\times 3$ , paratype, 117166i.<br>Horizon and locality same as A above. |      |
| E. <i>Camerella pennsylvanica</i> Cooper, new species.....  | 575  |
| (45-49) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen, $\times 1$ , holotype, 117142.<br>Row Park formation, field east of the railroad cut, north side of the Cumberland Valley RR., 2 miles southwest of Marion, Chambersburg (15') Quadrangle, Pa.  |      |
| F. <i>Camerella varians</i> Billings.....   | 583  |
| (50-54) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen, $\times 1$ , hypotype, Y.P.M. 15284.<br>Mingan formation, Eskimo Island, Mingan Group, St. Lawrence River, Canada.  |      |

## PLATE 119

BREVICAMERA, PARALLELELASMA, PARASTROPHINA, PERIMECOCOELIA,  
PROTOZYGA, STENOCAMARA

- |   |     |
|---|-----|
| A. <i>Parastrophina bilobata</i> Cooper, new species.....   | 605 |
| (1-5) Respectively pedicle, posterior, side, anterior, and brachial views, $\times 3$ , of the holotype, 117166b.<br>Pratt Ferry formation (about 3 feet above the base), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala. |     |
| B. <i>Perimecocoelia semicostata</i> Cooper, new species.....   | 594 |
| (6) Interior of the pedicle valve showing the spondylium, $\times 2$ , paratype, 117159f;   |     |

	Page
(7) enlarged view of spondylium of same specimen, $\times 4$ , showing folding over of anterior end.	
Horizon and locality same as preceding.	
C. <i>Stenocamara perplexa</i> Cooper, new species.....	603
(8) Posterior of a small specimen showing the dental plates of the pedicle valve and the median septum of the brachial valve, $\times 2$ , paratype, 111322. Photograph taken under water.	
Mosheim formation, $\frac{1}{2}$ mile east of Odenville, Springville (30') Quadrangle, Ala.	
D. <i>Protozyga exigua</i> (Hall).....	678
(9-12, 14) Respectively posterior, side, pedicle, brachial, and anterior views of a complete specimen, $\times 2$ , hypotype, 117242e; (13) the same specimen, $\times 1$ .	
Rockland formation (Napanee member), just west of the Mill Creek bridge in the city of Lowville, Lowville (15') Quadrangle, N. Y.	
E. <i>Brevicamara camerata</i> Cooper, new species.....	561
(15) Exterior of a nearly perfect brachial valve, $\times 2$ , holotype, 117154c; (16) interior of the same specimen, $\times 4$ , showing the cardinalia in detail.	
Horizon and locality same as A above.	
F. <i>Parallelasma pentagonum</i> Cooper, new species.....	614
(17, 18) Side and posterior views of the apical end of a specimen with both valves in contact, $\times 3$ , paratype, 117156c; (19, 22, 23) side and interior views of a fragmentary pedicle valve showing spondylium, teeth, and sockets outside the teeth, $\times 8$ , $\times 4$ , $\times 8$ , paratype, 117156g; (20) exterior of a nearly complete pedicle valve, $\times 2$ , paratype, 117156e; (21) interior of another pedicle valve, $\times 2$ , showing form of spondylium, paratype, 117156j; (24, 31) respectively $\times 4$ and $\times 8$ views of another pedicle interior showing the spondylium in normal and side views, and the side view showing the socket on the inside of the tooth, paratype, 117156h; (25) fragment of anterior part of a specimen with both valves in contact and showing the strainer "webs" between the ends of the costae, $\times 3$ , paratype, 117156f; (26) fragment of a brachial interior showing short, blunt brachiophore and supporting plate, $\times 8$ , paratype, 117156d; (27, 28) respectively $\times 4$ and $\times 8$ views of the brachial interior showing brachiophores, accessory teeth on brachiophores, and sockets, holotype, 117156-1; (29) same in side view, $\times 8$ ; (30) interior of another brachial valve showing sockets, brachiophores and their supporting plates, $\times 8$ , paratype, 117156a.	
Horizon and locality same as A above.	

## PLATE 120

## DIDYMELASMA, NEOSTROPHIA

A. <i>Neostrophia ? gregaria</i> Cooper, new species.....	590
(1, 2) Brachial and pedicle views of a complete specimen showing the median septum, $\times 2$ , paratype, 111310a; (3-6) respectively anterior, side, posterior, and brachial views of a complete specimen, $\times 2$ , holotype, 111310b.	
Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.	
B. <i>Neostrophia subcostata</i> Ulrich and Cooper.....	591
(7, 10, 12) Anterior, pedicle, and side views of a complete specimen, $\times 2$ , paratype, 66309b; (8, 9) side and posterior views of a young specimen, $\times 2$ , paratype, 66309e; (11, 13, 15) respectively anterior, posterior, and brachial views, $\times 2$ , of the holotype, 66309a; (14) brachial view of an adult specimen, showing anterior costation, $\times 2$ , paratype, 66309f; (16) posterior of a polished specimen	

- showing apical structures,  $\times 2$ , paratype, 66309d. The pedicle valve is the lower one in the figure.
- Boulder in Mystic conglomerate, Range 6, Lot 20, Stanbridge Township, near Mystic, Quebec, Canada.
- C. *Neostrophia* ? sp. 1..... 591  
 (17) Brachial valve,  $\times 3$ , figured specimen, 117176b; (18) group of specimens,  $\times 3$ , figured specimen, 117176a.  
 Ward Cove ? formation (basal part of 80-foot bed), Jeff Gillespie's place, Thompson Valley, 14 miles southwest of Tazewell, Tazewell County, Pounding Mill (15') Quadrangle, Va.
- D. *Didymelasma longicrurum* Cooper, new species..... 617  
 (19-23) Respectively anterior, posterior, brachial, side, and pedicle views of a complete specimen,  $\times 3$ , holotype, 117158c; (24-26) respectively pedicle, side, and brachial views of a complete specimen younger than the preceding,  $\times 3$ , paratype, 117158d; (27) small slab showing group of valves,  $\times 1$ , paratype, 117158a; (28) part of the preceding,  $\times 3$ ; (29) part of another slab surface,  $\times 3$ , showing brachial and pedicle interiors, paratype, 117158b. Note long parallel plates in the brachial interiors.  
 Lebanon formation, road cut on U. S. Highway 41,  $\frac{3}{4}$  mile southeast of Knox Branch, 9 miles southeast of Murfreesboro, Rutherford County, Tenn.
- E. *Didymelasma abruptum* Cooper, new species..... 616  
 (30) Exterior of the pedicle valve,  $\times 2$ , paratype, Columbia Univ. 26403(928)a; (31) brachial exterior,  $\times 2$ , holotype, Columbia Univ. 26403(928)b; (32) group of immature valves not showing marked sulcus or fold,  $\times 2$ , paratype, Columbia Univ. 26403(928)c; (33) several valves on a small slab,  $\times 3$ , paratype, Columbia Univ. 26403(928)c.  
 Rockland formation, northeast of Gretna, Ontario, Canada.

## PLATE 121

CAMERELLA, DALMANELLA, HESPERONOMIELLA, MACROCOELIA, ONYCHOPLECIA,  
 PARALLELELASMA, TRIPLESIA

- A. *Parallelelasma pentagonum* Cooper, new species..... 614  
 (1) Anterior view of a brachial valve showing the strainer "webs" between the anterior costae,  $\times 4$ , paratype, 111329. Same specimen as pl. 115, H, fig. 49.  
 Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- B. *Dalmanella crassicostellata* Cooper, new species..... 949  
 (2) Brachial view,  $\times 1$ , of the holotype, 117361d; (3-7) respectively posterior, anterior, pedicle, side, and brachial views,  $\times 2$ , of the holotype; (8) interior of the brachial valve,  $\times 3$ , showing parallel plates and cardinal process, paratype, 117361e.  
 Hermitage formation (base), on Tennessee Highway 53, 0.7 mile south of Woodbury, Woodbury (15') Quadrangle, Tenn.
- C. *Onychoplecia* sp. 1..... 536  
 (9, 10) Exterior and side views of an adult brachial valve showing distant costae,  $\times 2$ , figured specimen, 117096b; (11) exterior of a young pedicle valve,  $\times 3$ , figured specimen, 117096a; (12) plasticine replica of the exterior of an adult pedicle valve,  $\times 2$ , figured specimen, 117096c.  
 Sevier formation (top sandstone No. 5), 0.28 mile northwest of Fourmile Church, Tallassee (T.V.A. 139-SE) Quadrangle, Tenn.
- D. *Triplesia* sp. 1..... 539  
 (13) Exterior of an imperfect pedicle valve,  $\times 2$ , figured specimen, 117097.

	Page
Whitesburg formation, 1½ miles west of Bulls Gap, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.	
E. <i>Camerella</i> sp. 4.....	587
(14) Exterior of brachial valve showing depression in fold, × 2, figured specimen, 123294. Horizon and locality same as preceding.	
F. <i>Onychoplecia matutina</i> Cooper, new species.....	534
(15) Exterior of a small pedicle valve, × 3, paratype, 117941a; (16) exterior of a brachial valve showing radial lines of exfoliated shell, × 3, paratype, 117941b. Jasper formation, just northwest of Pindall, Yellville (30') Quadrangle, Ark. (17) Exterior of another pedicle valve, larger than that of fig. 15, × 3, holotype, 117940a. Everton formation (base), near school, northwest of Pindall, Yellville (30') Quadrangle, Ark.	
G. <i>Macrocoelia plebeia</i> Cooper, new species.....	899
(18) Exterior of a complete specimen seen from the brachial side, × 2, holotype, 117793a; (19) imperfect brachial valve showing cardinalia, × 2, paratype, 117793b. Lenoir formation (45 feet above the base), 0.1 mile southwest of triangulation point 37SH, Wildwood (T.V.A. 147-SE) Quadrangle, Tenn.	
H. <i>Hesperonomiella minor</i> (Walcott).....	337
(20) Small slab, × 1, showing pedicle and brachial interiors, hypotype, 117939; (21) view of the same slab enlarged, × 3, to show the pallial markings, teeth, and muscle scars of the interior of the two pedicle valves; (22) the interior of the brachial valve, × 2, showing the stout cardinalia. Upper Pogonip = Wahwah formation, T. 22 S., R. 14 W., Confusion Range, Millard County, Utah.	

## PLATE 122

## LIRICAMERA, PLECTOCAMARA

A. <i>Liricamera nevadensis</i> Cooper, new species.....	592
(1-4) Respectively posterior, side, anterior, and brachial views of a complete specimen, × 1, holotype, 117174g; (5) posterior part of the pedicle interior showing the spondylium, × 2, paratype, 117174h; (6) another pedicle interior seen from the side, × 2, paratype, 117174e; (7) pedicle interior of a nearly perfect valve, × 2, paratype, 117174f; (8) brachial interior, × 2, paratype, 117174d. Pogonip group ( <i>Orthidiella</i> zone, mottled zone 700 feet below the Eureka quartzite), base of the first ridge east of Frenchman Flat, Las Vegas (1°) Quadrangle, Nev.	
B. <i>Plectocamara costata</i> Cooper, new species.....	598
(9-13) Respectively anterior, side, pedicle, brachial, and posterior views of a complete specimen, × 3, holotype, 111360a. Lincolnshire formation (Hogskin member), Sally Cleveland Farm, ¾ mile southwest of Washburn, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn. (14-18) Respectively brachial, posterior, pedicle, anterior, and side views of a young specimen, × 3, paratype, 111368a; (19) pedicle interior showing spondylium, × 3, paratype, 111368b. Lincolnshire formation (Hogskin member), on Washburn road, 4½ miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn. (20, 21) Brachial interior in normal view and tilted to show cruralium and absence of median septum, × 3, paratype, 111356. Lincolnshire formation (Hogskin member), ca. ½ mile north of Thorn Hill, on U. S. Highway 25E, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.	

- |   | Page |
|---|------|
| C. <i>Plectocamara aseptata</i> Cooper, new species.....  | 597  |
| (22-26) Respectively anterior, posterior, side, brachial, and pedicle views of a fine, complete specimen, $\times 3$ , holotype, 111361a.<br>Benbolt formation (15 feet above the base), $1\frac{1}{2}$ miles west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.  |      |
| D. <i>Plectocamara aseptata</i> Cooper, new species.....  | 597  |
| (27-29) Respectively pedicle, side, and brachial views of a young specimen, $\times 3$ , paratype, 117181.<br>Ward Cove formation, 2 miles southwest of Hall Crossroad, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.   |      |
| E. <i>Plectocamara rotunda</i> Cooper, new species.....   | 600  |
| (30-34) Respectively brachial, anterior, side, posterior, and pedicle views of a complete specimen, $\times 3$ , paratype, 117186e.<br>Chatham Hill formation, 1.2 miles S. $31^\circ$ E. of Sharon Springs, Burkes Garden (15') Quadrangle, Va.  |      |
| F. <i>Plectocamara transversa</i> Cooper, new species.....  | 602  |
| (35) Pedicle exterior, $\times 1$ , holotype, 117188; (36, 37) pedicle exterior and interior, $\times 2$ , showing spondylium and extremely abbreviated median septum, holotype.<br>Edinburg formation (lower <i>Nidulites</i> zone), 100 yards south of Battlefield Crystal Caverns entrance on U. S. Highway 11, 1 mile north of Strasburg, Strasburg (15') Quadrangle, Va.   |      |
| G. <i>Plectocamara magna</i> Cooper, new species.....   | 600  |
| (38-42) Respectively pedicle, anterior, posterior, brachial, and side views, $\times 1$ , of the holotype, 117185a; (43-47) respectively posterior, anterior, brachial, side, and pedicle views, $\times 2$ , of the holotype; (48, 49) pedicle and brachial views of an impression of the interior prepared by burning the shell and scraping it away from a complete specimen, $\times 2$ , paratype, 117185b; (50) posterior of the preceding interior impression, $\times 3$ , showing slots of the spondylium; (51) plasticine replica of the posterior internal structures, $\times 3$ , showing cruralium with only vestige of the median septum, prepared from the preceding.<br>Shippensburg formation (Pinesburg member—lower part of cobbly <i>Echino-sphaerites</i> zone), on U. S. Highway 40, on the west side of Conococheague Creek, 7 miles west of Hagerstown, Williamsport (15') Quadrangle, Md. |      |

## PLATE 123

## PLECTOCAMARA

- |  |     |
|--|-----|
| A. <i>Plectocamara sulcata</i> Cooper, new species.....  | 601 |
| (1) Brachial view of a complete specimen, $\times 1$ , holotype, 117187; (2, 3, 4-6) respectively brachial, posterior, anterior, side, and pedicle views, $\times 2$ , of the preceding specimen.<br>Benbolt formation, south side of Mount Hagan School, Hilton (T.V.A. 197-NW) Quadrangle, Va. |     |
| B. <i>Plectocamara</i> cf. <i>P. aseptata</i> Cooper, new species.....   | 597 |
| (7-11) Respectively pedicle, posterior, side, anterior, and brachial views of a pauciplicate specimen, $\times 3$ , figured specimen, 117180a.<br>Sevier formation (near base), $\frac{1}{4}$ mile northeast of Miser, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.                              |     |
| C. <i>Plectocamara aseptata</i> Cooper, new species.....   | 597 |
| (12-16) Respectively pedicle, anterior, side, posterior, and brachial views of a complete specimen, $\times 3$ , paratype, 117180b.<br>Horizon and locality same as preceding.   |     |

	Page
D. <i>Plectocamara erecta</i> Cooper, new species.....	599
(17-21) Respectively anterior, posterior, pedicle, side, and brachial views of a complete specimen, $\times 3$ , holotype, 117183. Wardell formation (upper <i>Receptaculites</i> bed), Lee Valley, Lee Valley (T.V.A. 171-NW) Quadrangle, Tenn.	
E. <i>Plectocamara costata</i> Cooper, new species.....	598
(22-26) Respectively anterior, brachial, side, pedicle, and posterior views of a small paucicostate specimen, $\times 3$ , paratype, 117184. Lincolnshire formation (Hogskin member— <i>Oligorhynchia</i> zone), 0.4 mile east-northeast of Red Hill, $4\frac{1}{4}$ miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.	
F. <i>Plectocamara</i> cf. <i>P. costata</i> Cooper, new species.....	598
(27-31) Respectively pedicle, anterior, side, posterior, and brachial views of a large specimen, $\times 3$ , figured specimen, 123457. Horizon and locality same as preceding.	
G. <i>Plectocamara aseptata</i> Cooper.....	597
(32-36) Respectively pedicle, brachial, posterior, side, and anterior views of a large specimen, $\times 2$ , paratype, 111361c; (37-40) respectively side, brachial, anterior, and pedicle views of a small specimen, $\times 3$ , paratype, 117182a; (41-44) posterior, anterior, side, and pedicle views of a specimen larger than the preceding, $\times 3$ , paratype, 117182b; (45-49) respectively anterior, pedicle, side, posterior, and brachial views of a large, fully grown specimen, $\times 3$ , paratype, 117182c; (50-54) respectively anterior, posterior, side, brachial, and pedicle views of a large but not fully grown individual, $\times 3$ , paratype, 117182d. Benbolt formation (base), east side of Brick Church, $1\frac{1}{2}$ miles west-southwest of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Tenn.	

## PLATE 124

## DORYTRETA, OLIGORHYNCHIA, ROSTRICELLULA, SPHENOTRETA

A. <i>Dorytreta ovata</i> Cooper, new species.....	667
(1, 8) Brachial and pedicle views of a medium-sized specimen, $\times 4$ , paratype, 117193a; (2-5, 9) respectively brachial, anterior, side, posterior, and pedicle views of a complete specimen, $\times 4$ , paratype, 117193b; (6, 7) pedicle and brachial views of a small specimen, $\times 4$ , paratype, 117193c. Lenoir formation (calcarenite under the Mosheim), south side of the cemetery at Friends Church, north corner of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn. (10-13) Respectively anterior, pedicle, side, and brachial views of a nearly complete specimen, $\times 4$ , holotype, 117192. Lenoir formation (basal foot), west of Friendsville Station and just south of Friends Church, Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
B. <i>Oligorhynchia subplana</i> Cooper.....	662
(14-17) Respectively anterior, side, pedicle, and brachial views of a long, slender specimen, $\times 4$ , hypotype, 118014. Ward Cove formation, north of the road, $\frac{3}{4}$ mile southwest of Mount Eager Church, Hogskin Valley, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.	
C. <i>Sphenotreta sulcata</i> Cooper, new species.....	666
(18) Brachial view of a small individual, $\times 4$ , paratype, 117190b; (19-23) respectively posterior, brachial, pedicle, side, and anterior views of a large specimen, $\times 4$ , holotype, 117190a. McLish formation (bed 45), West Spring Creek, sec. 6, T. 2 S., R. 1 W., Murray County, Okla.	



- |  | Page |
|--|------|
| D. <i>Oligorhynchia inexpectata</i> Cooper, new species.....   | 661  |
| (24) Exterior of the brachial valve, $\times 3$ , paratype, 117203b; (25) pedicle exterior, $\times 3$ , holotype, 117203a.  |      |
| Red Knobs formation (between the Athens cobbly beds and the marble), road along Hiwassee River, 1½ miles southeast of Charleston, Calhoun (T.V.A. 125-SE) Quadrangle, Tenn.  |      |
| E. <i>Oligorhynchia subplana</i> Cooper.....   | 662  |
| (26, 27, 31) Side, anterior, and pedicle views of a small and elongate specimen, $\times 3$ , hypotype, 117201b; (28-30) side, brachial, and anterior views of a specimen larger than the preceding, $\times 3$ , hypotype, 117201a.   |      |
| Sevier formation, ¼ mile northeast of Miser, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.  |      |
| F. <i>Sphenotreta acutirostris</i> (Hall).....   | 664  |
| (32-35) Respectively brachial, pedicle, side, and anterior views of a complete specimen, $\times 4$ , hypotype, Carnegie Mus. 5439; (36, 37) brachial and pedicle views of an imperfect specimen, $\times 4$ , hypotype, Carnegie Mus. 5440.   |      |
| Crown Point formation, McCullough's Sugar Bush, Chazy, Rouses Point (15') Quadrangle, N. Y.  |      |
| (38) Pedicle view of a large specimen, $\times 1$ , hypotype, 118015.  |      |
| Crown Point formation, near Fort Cassin, Port Henry (15') Quadrangle, Vt.  |      |
| G. <i>Dorytreta bella</i> Cooper, new species.....   | 667  |
| (39-43) Respectively pedicle, anterior, side, posterior, and brachial views of a perfect specimen, $\times 4$ , holotype, 117191a.   |      |
| McLish formation (upper), roadside ditch in NW¼ sec. 18, T. 2 N., R. 5 E., Pontotoc County, Okla.  |      |
| H. <i>Rostricellula cuneata</i> Cooper, new species.....   | 637  |
| (44, 45) Pedicle and brachial views of an imperfect specimen, $\times 4$ , holotype, 117218a.  |      |
| Bromide formation (Mountain Lake member), west side U. S. Highway 77, sec. 25, T. 2 S., R. 1 E., 2 to 3 miles north of Springer, Carter County, Okla.  |      |
| I. <i>Sphenotreta cuneata</i> Cooper, new species.....   | 665  |
| (46-50) Respectively anterior, pedicle, side, brachial, and posterior views of a complete specimen, $\times 4$ , holotype, 117189a; (51) brachial exterior, $\times 4$ , paratype, 117189g; (52) another brachial exterior wider than the preceding, $\times 4$ , paratype, 117189d; (53) pedicle exterior, $\times 4$ , paratype, 117189b; (54) brachial and pedicle valve on slab, $\times 4$ , paratype, 117189c. |      |
| Sevier formation, ⅓ mile southeast of Hambright Mine, 8 miles south of Cleveland, Tenn.  |      |
| J. <i>Dorytreta ? reversa</i> Cooper, new species.....   | 668  |
| (55-59) Respectively posterior, brachial, side, anterior, and pedicle views of a complete specimen, $\times 3$ , holotype, 117194; (60) brachial view, $\times 4$ , of holotype; (61) brachial view, $\times 1$ , of holotype.   |      |
| Lincolnshire formation (Hogskin member), 0.4 mile east-northeast of Red Hill, 4½ miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.  |      |

## PLATE 125

## OLIGORHYNCHIA

- |   |     |
|---|-----|
| A. <i>Oligorhynchia subplana gibbosa</i> Cooper.....  | 662 |
| (1-3) Side, brachial, and pedicle views of a complete specimen, $\times 1$ , hypotype, 90751; (4-8) respectively anterior, posterior, brachial, side, and pedicle views, $\times 4$ , of the preceding. |     |

	Page
Lincolnshire formation (Hogskin member), Luttrell, Luttrell (T.V.A. 155-NW) Quadrangle, Tenn.	
(9, 10) Brachial and pedicle views, $\times 1$ , hypotype, 111304; (11-15) respectively anterior, side, posterior, brachial, and pedicle views, $\times 4$ , of the preceding specimen.	
Lincolnshire formation (Hogskin member), 3 miles west-southwest of Thorn Hill on road to Washburn, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.	
B. <i>Oligorhynchia subplana</i> Cooper.....	662
(16-19) Respectively brachial, anterior, side, and pedicle views of a young specimen, $\times 4$ , hypotype, 117202b; (20-24) respectively posterior, anterior, side, brachial, and pedicle views of a nearly full-grown specimen, $\times 4$ , hypotype, 117202a.	
Lincolnshire formation (Hogskin member), 200 yards north of highway along farm lane, $\frac{1}{2}$ mile southwest of Fleanor Mill, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.	
(25-29) Respectively brachial, side, anterior, pedicle, and posterior views of a complete specimen, $\times 4$ , hypotype, 117200a; (31-35) respectively side, anterior, posterior, brachial, and pedicle views of a complete specimen, $\times 4$ , hypotype, 117200b.	
Horizon and locality same as A, figs. 9-15, above.	
(30, 36) Brachial and pedicle views of two small specimens, $\times 4$ , hypotypes, 117201a, 117201b.	
Sevier shale, $\frac{1}{4}$ mile northeast of Miser, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.	
C. <i>Oligorhynchia angulata</i> Cooper.....	659
(37-41) Respectively brachial, anterior, posterior, side, and pedicle views of a complete specimen, $\times 3$ , hypotype, 117196.	
Horizon and locality same as A, figs. 9-15, above.	
(42-46) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen, $\times 4$ , lectotype, Y.P.M. S2258.	
Lincolnshire formation (Hogskin member), Luttrell, Luttrell (T.V.A. 155-NW) Quadrangle, Tenn.	
D. <i>Oligorhynchia angulata</i> Cooper.....	659
(47, 48) Brachial interiors, $\times 8$ , showing cardinalia, hypotypes, 117195b, 117195c; (49) brachial interior, $\times 6$ , showing brachial plates, hypotype, 117195a.	
Horizon and locality same as A, figs. 9-15, above.	
E. <i>Oligorhynchia subplana gibbosa</i> Cooper.....	662
(50) Brachial view of a complete specimen, $\times 4$ , holotype, Y.P.M. S2252.	
Lincolnshire formation (Hogskin member), Luttrell, Luttrell (T.V.A. 155-NW) Quadrangle, Tenn.	

## PLATE 126

## ANCISTRORHYNCHA, ATELELASMA, CHAULISTOMELLA, DALMANELLA, OLIGORHYNCHIA, PHRAGMORTHIS, PLECTOCAMARA

A. <i>Oligorhynchia elongata</i> Cooper, new species.....	660
(1-5) Respectively anterior, posterior, brachial, side, and pedicle views of a long, slender specimen, $\times 4$ , holotype, 118016.	
Wardell formation (between <i>Sowerbyella</i> and <i>Hesperorthis</i> beds), Evans Ferry section, road cut on U. S. Highway 25E, 0.8 mile north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.	
B. <i>Ancistrorhynchia costata</i> Ulrich and Cooper.....	621
(6-9) Respectively pedicle, anterior, side, and brachial views of a complete specimen, $\times 2$ , hypotype, 123291a.	

- Page
- Plattin group, east side of Arkansas Highway 69, 2 miles north of Cushman, Batesville (30') Quadrangle, Ark.
- C. *Oligorhynchia angulata* Cooper..... 659  
(10-12) Pedicle, side, and brachial views of a complete specimen,  $\times 3$ , hypotype, 118017.  
Sevier formation (limy plates in), slope on west side of church in Guthrie Gap, 2 miles south-southeast of White Horn, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.
- D. *Oligorhynchia bifurcata* Cooper, new species..... 659  
(13-17) Respectively anterior, side, pedicle, posterior, and brachial views of a medium-sized specimen,  $\times 4$ , paratype, 117197b; (18-22) respectively posterior, brachial, side, pedicle, and anterior views of a young specimen,  $\times 4$ , paratype, 117197c; (23, 24) pedicle and anterior views of a large specimen,  $\times 4$ , showing rib in sulcus, holotype, 117197a.  
Benbolt formation (top), road cut on U. S. Highway 19,  $1\frac{1}{2}$  miles southeast of Hansonville, Brumley (T.V.A. 205-SE) Quadrangle, Va.
- E. *Plectocamara aseptata* Cooper, new species..... 597  
(25-29) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen,  $\times 3$ , paratype, 111361b.  
Benbolt formation (15 feet above the base),  $1\frac{1}{2}$  miles west-southwest of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- F. *Phragmothris crassa* Cooper, new species..... 511  
(30) Brachial view,  $\times 1$ , holotype, 116963; (31-35) respectively anterior, posterior, brachial, side, and pedicle views,  $\times 2$ , of the holotype.  
Martinsburg formation (part with *Brongniartella* and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.
- G. *Chaulistomella* ? sp. 2..... 445  
(36) Plasticine replica of the brachial interior,  $\times 2$ , showing cardinalia; (37) impression of the brachial interior from which the preceding was prepared,  $\times 2$ , figured specimen, 117009b; (38) brachial exterior,  $\times 1$ , figured specimen, 117009a; (40) imperfect pedicle exterior,  $\times 2$ , figured specimen, 117009f; (39) enlargement,  $\times 4$ , of the pedicle exterior of the preceding.  
Oranda formation, railroad cut,  $\frac{1}{2}$  mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.
- H. *Atelelasma perfectum* Cooper, new species..... 522  
(41-45) Respectively posterior, brachial, side, anterior, and pedicle views of a complete specimen,  $\times 1$ , paratype, 117014a.  
Arline formation (top), 1 mile northeast of Friendsville, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.
- I. *Dalmanella rara* Cooper, new species..... 949  
(46) Brachial view,  $\times 1$ , of the paratype, 117362a; (47-51) respectively posterior, anterior, brachial, side, and pedicle views,  $\times 2$ , of the holotype.  
Curdsville formation, road cut on Tennessee Highway 33,  $5\frac{1}{2}$  miles northeast of Maynardville, Maynardville (T.V.A. 145-SE) Quadrangle, Tenn.

## PLATE 127

## ANCISTORHYNCHA, OLIGORHYNCHIA

- A. *Oligorhynchia bifurcata* Cooper, new species..... 659  
(1-5) Respectively anterior, pedicle, side, posterior, and brachial views,  $\times 3$ , of the paratype, 98205.  
Benbolt formation, Miller Farm on northeast slope of Wallen Ridge, 2 miles southeast of Olinger, Olinger (T.V.A. 178-SE) Quadrangle, Lee County, Va.

	Page
(6) Brachial exterior, $\times 3$ , paratype, 117198a; (7) pedicle exterior, $\times 3$ , paratype, 117198b.	
Edinburg formation (St. Luke facies), on Swover Creek, 4.6 miles N. 69° W. of Edinburg, near Lantz Mills, Edinburg (15') Quadrangle, Va.	
(8) Pedicle exterior, $\times 3$ , paratype, 118025.	
Benbolt formation ( <i>Oligorhynchia</i> beds), $\frac{1}{2}$ mile southeast of Richpatch, Eagle Rock (15') Quadrangle, Va.	
B. <i>Oligorhynchia angulata</i> Cooper.....	659
(9-13) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen, $\times 4$ , hypotype, 118017.	
Sevier formation (thin limestone beds), slope west of church in Guthrie Gap, 2 miles south-southeast of White Horn, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.	
C. <i>Ancistrorhynchia ? perplexa</i> Cooper, new species.....	625
(14) Brachial view, $\times 1$ , of the holotype, 111297; (15-19) respectively brachial, anterior, posterior, side, and pedicle views, $\times 2$ , of the holotype.	
McLish formation, 1 mile south of McLish ranch house, sec. 35, T. 1 S., R. 7 E., north of Bromide, Johnston County, Okla.	
D. <i>Ancistrorhynchia crassa</i> Cooper, new species.....	623
(20-22) Anterior, brachial, and pedicle views of a complete individual, $\times 1$ , paratype, 111184a; (23-27) respectively anterior, pedicle, side, posterior, and brachial views, $\times 2$ , of the preceding.	
Wardell part of Dryden formation, 1 mile west of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.	
E. <i>Ancistrorhynchia australis</i> (Foerste).....	620
(28-32) Respectively side, anterior, posterior, brachial, and pedicle views, $\times 2$ , of the lectotype, 87043a.	
Camp Nelson formation, High Bridge, Harrodsburg (30') Quadrangle, Ky.	
F. <i>Ancistrorhynchia australis</i> (Foerste).....	620
(33, 34) Respectively $\times 1$ and $\times 2$ enlargements of the brachial valve of a complete specimen, hypotype, 111291b; (35-37) anterior, pedicle, and posterior views of another complete specimen, $\times 2$ , hypotype, 111291a; (39) brachial view of a large specimen, $\times 1$ , hypotype, 111291c; (38, 40, 41) side, anterior, and brachial views, $\times 2$ , of the preceding large specimen.	
Horizon and locality same as preceding.	
G. <i>Ancistrorhynchia australis</i> (Foerste).....	620
(42-46) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen, $\times 2$ , hypotype, Columbia Univ., no number.	
Nealmont formation, 1 mile west of Tusseyville, Centre Hall (15') Quadrangle, Pa.	
H. <i>Ancistrorhynchia costata</i> Ulrich and Cooper.....	621
(47) Brachial view, $\times 1$ , hypotype, 117204c; (48-52) respectively anterior, side, posterior, pedicle, and brachial views, $\times 2$ , of the preceding.	
Bromide formation (Pooleville member—5 feet below the Viola limestone), road cut on Oklahoma Highway 99, NW $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 12, T. 1 N., R. 6 E., Pontotoc County, Okla.	
I. <i>Ancistrorhynchia crassa</i> Cooper, new species.....	623
(53-57) Respectively posterior, anterior, side, pedicle, and brachial views of a complete specimen, $\times 2$ , paratype, Columbia Univ. 26407(1016).	
Hatter (Hostler ?) formation, 1 mile south of Covedale, Blair County, Pa.	
J. <i>Ancistrorhynchia costata</i> Ulrich and Cooper.....	621
(58-62) Respectively anterior, posterior, pedicle, side, and brachial views of a	

well-preserved specimen,  $\times 2$ , hypotype, 117204b; (63) brachial view,  $\times 1$ , of the preceding.

Horizon and locality same as H above.

PLATE 128

ANCISTRORHYNCHA, DREPANORHYNCHA, MIMELLA, ORTHORHYNCHULA, RHYNCHOTREMA

- |  | Page |
|--|------|
| A. <i>Mimella gilberti</i> Cooper, new species.....  | 471  |
| (1-5) Respectively anterior, posterior, side, brachial, and pedicle views, $\times 1$ , of the holotype, 123288a.  |      |
| Ellett formation (40 to 100 feet above Knox dolomite), west side road, 2 miles south of Lusters Gate, Blacksburg (15') Quadrangle, Va.   |      |
| B. <i>Ancistrorhyncha globularis</i> Cooper, new species.....  | 624  |
| (6-9) Respectively anterior, side, pedicle, and brachial views, $\times 2$ , of the holotype, 111278a.   |      |
| Bromide formation (Pooleville member), 4 miles west and 2 miles south of Davis, Murray County, Okla.   |      |
| C. <i>Ancistrorhyncha ? vacua</i> Cooper, new species.....   | 625  |
| (10-13) Respectively anterior, side, brachial, and pedicle views, $\times 2$ , of the holotype, 111282a.   |      |
| Mingan formation (zone A5), Bald Island, Mingan group, St. Lawrence River, Quebec, Canada.   |      |
| D. <i>Ancistrorhyncha missouriensis</i> Cooper, new species.....   | 624  |
| (14, 16-19) Respectively anterior, pedicle, posterior, side, and pedicle views, $\times 2$ , of the holotype, 111284a; (15) brachial view, $\times 1$ , of the holotype.   |      |
| Rock Levee formation (lower), junction of Missouri Highway 74 and U. S. Highway 61, Rock Levee, NW. corner sec. 24, T. 30 N., R. 13 E., 3 $\frac{1}{4}$ miles southwest of Cape Girardeau, Cape Girardeau (15') Quadrangle, Mo.  |      |
| E. <i>Drepanorhyncha ottawaensis</i> (Billings).....   | 628  |
| (21, 22, 24) Respectively anterior, pedicle, and brachial views of a complete specimen, $\times 1$ , lectotype, G.S.C. 1143g; (26) side view of another individual, $\times 1$ , paratype, G.S.C. 1143e; (23) interior seen from the side, $\times 1$ , paratype, G.S.C. 1143h; (28, 31) same as preceding but tilted to show long brachial processes in two views, $\times 2$ ; (20, 27) brachial and pedicle interiors, showing crural bases and dental plates, $\times 2$ , hypotype, 85338a, b; (29) brachial cardinalia, $\times 3$ , same as preceding; (25, 30) normal and tilted views of a pedicle interior showing the long dental plates, $\times 2$ , paratype, G.S.C. 1143? |      |
| Rockland formation, Paquette Rapids, Ontario, Canada.  |      |
| F. <i>Orthorhynchula linneyi</i> (James).....  | 669  |
| (33, 36) Side and posterior views of a complete specimen, $\times 1$ , showing interarea, figured specimen, 87042a.  |      |
| Fairmount formation, 1 mile north of Paint Lick, Garrard County, Ky.   |      |
| (34) Brachial interior, $\times 1$ , figured specimen, 111352; (35, 32) normal and tilted views of the preceding, $\times 2$ , showing crural bases and cardinal process for comparison with <i>Drepanorhyncha</i> .   |      |
| Perryville formation, Harrodsburg, Mercer County, Ky.  |      |
| G. <i>Drepanorhyncha ambigua</i> (Hall).....   | 627  |
| (37) Exterior of the pedicle valve, $\times 1$ , hypotype, 111344a; (38, 39) side and exterior views of the brachial valve, $\times 1$ , hypotype, 111344b.  |      |
| Trenton group (Hull formation), Harris' (Pierce's) Farm, east of Middleville, Little Falls (15') Quadrangle, N. Y.   |      |
| H. <i>Rhynchotrema wisconsinense</i> Fenton and Fenton.....  | 630  |
| (40-44) Respectively side, anterior, posterior, pedicle, and brachial views of a per-  |      |

fect specimen,  $\times 1$ , hypotype, 24843a; (48) interior of pedicle valve of preceding,  $\times 2$ , showing musculature; (45, 46, 47) anterior, brachial, and side views of an obese individual,  $\times 1$ , hypotype, 24843b.

Decorah formation (Ion member), NE $\frac{1}{4}$  sec. 39, Cannon Falls, Goodhue County, Minn.

## PLATE 129

## ANCISTRORHYNCHA, ROSTRICELLULA

- A. *Ancistrorhyncha costata* Ulrich and Cooper..... 621  
 (1) Brachial view,  $\times 2$ , hypotype, Columbia Univ. 25880(2120).  
 Pamela formation (50 inches below top), quarry east of railroad bridge, north of Mill Creek in Lowville, Lowville (15') Quadrangle, N. Y.
- B. *Ancistrorhyncha costata* Ulrich and Cooper..... 621  
 (2) Brachial view of a complete specimen,  $\times 2$ , hypotype, 117207.  
 Ridley formation, quarry on the west side of the road, 1 $\frac{1}{2}$  miles south-south-east of Cove Church, 5 miles south of Chickamauga, Kensington (T.V.A. 106-SE) Quadrangle, Ga.
- C. *Ancistrorhyncha costata* Ulrich and Cooper..... 621  
 (3) Brachial view of a complete specimen,  $\times 1$ , hypotype, 117204a; (4-8) respectively posterior, anterior, pedicle, side, and brachial views,  $\times 2$ , of the preceding.  
 Bromide formation (Pooleville member—5 feet below Viola), road cut on Oklahoma Highway 99, NW $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 12, T. 1 N., R. 6 E., Pontotoc County, Okla.
- D. *Ancistrorhyncha costata* Ulrich and Cooper..... 621  
 (9-13) Respectively anterior, posterior, side, pedicle, and brachial views of a complete specimen,  $\times 2$ , hypotype, 117205.  
 Bromide formation (Pooleville member—base of bed 2), Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.
- E. *Ancistrorhyncha costata* Ulrich and Cooper..... 621  
 (14) Brachial view of a complete specimen,  $\times 1$ , hypotype, 111196; (15-19) respectively posterior, anterior, side, pedicle, and brachial views,  $\times 2$ , of the preceding.  
 Bromide formation (Pooleville member—top), Colbert Creek, sec. 15, T. 1 S., R. 1 E., 5 miles southwest of Davis, Murray County, Okla.
- F. *Ancistrorhyncha costata* Ulrich and Cooper..... 621  
 (20, 21) Respectively  $\times 1$  and  $\times 2$  enlargements of the holotype, 108203; (22, 23) respectively  $\times 1$  and  $\times 2$  views of a silicified specimen, paratype, 111183; (24) brachial interior,  $\times 4$ , showing cardinalia and hook on crus, paratype, 108204g; (25) another brachial interior,  $\times 4$ , showing hook on crus, paratype, 108204e.  
 Ridley or Murfreesboro formation, 1 $\frac{1}{2}$  miles southeast of Hembree Mill, Sequatchie Valley, Pikeville Special (15') Quadrangle, Tenn.
- G. *Rostricellula orientalis* (Billings)..... 642  
 (31) Brachial view of a complete specimen,  $\times 1$ , hypotype, 111489; (32) enlargement of the side of preceding,  $\times 6$ , showing ornamentation; (26-30) respectively anterior, posterior, side, pedicle, and brachial views,  $\times 2$ , of the preceding.  
 Mingan formation, Harbor Island, Mingan Group, St. Lawrence River, Quebec, Canada.
- H. *Ancistrorhyncha costata* Ulrich and Cooper..... 621  
 (33-36) Respectively pedicle, anterior, brachial, and side views of a complete specimen,  $\times 2$ , hypotype, 117206b; (37, 38) brachial and posterior views of a specimen slightly smaller than the preceding,  $\times 2$ , hypotype, 117206c.  
 Wardell part of Dryden formation (*Stromatocerium* bed), north quarry on

	Page
Station Creek, $\frac{1}{4}$ mile south of U. S. Highway 58, 2 miles east of Cumberland Gap, Wheeler (T.V.A. 153-SE) Quadrangle, Va.	
I. <i>Rostricellula plena</i> (Hall).....	645
(39-43) Respectively posterior, pedicle, brachial, anterior, and side views of a complete specimen, $\times 1$ , hypotype 111510; (44-48) respectively posterior, anterior, side, pedicle, and brachial views of another complete specimen, $\times 1$ , hypotype, 111509.	
Valcour formation, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
(49-53) Respectively posterior, pedicle, side, brachial, and anterior views of a large individual, $\times 1$ , hypotype, 111497a.	
Aylmer formation, Butlers Quarry, $3\frac{1}{2}$ miles west of l'Original, Ontario, Canada.	
PLATE 130	
LEPIDOCYCLUS, RHYNCHOTREMA, ROSTRICELLULA	
A. <i>Rhynchotrema kentuckiense</i> Fenton and Fenton.....	629
(1-5) Respectively pedicle, anterior, posterior, brachial, and side views of a complete specimen, $\times 1$ , hypotype, 117211a; (6) pedicle interior tilted to show dental plates, $\times 2$ , paratype, 117211b; (7) brachial interior, $\times 2$ , tilted to show septum, cardinal process, and crural bases, hypotype, 117211c; (8) brachial interior of preceding view, $\times 3$ , showing crural bases, crura, and cardinal process.	
Trenton formation, Paris, Bourbon County, Ky.	
B. <i>Rostricellula costata</i> Cooper, new species.....	636
(9-13) Respectively pedicle, side, anterior, posterior, and brachial views of a complete specimen, $\times 2$ , holotype, 111460a; (14-17) respectively pedicle, side, anterior, and brachial views, $\times 3$ , of the preceding.	
Lenoir formation (30 to 70 feet above ore-bed), 2 miles west-southwest of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
C. <i>Rostricellula plena plicifera</i> (Hall).....	646
(18, 19) Side and brachial views of Hall's type, $\times 1$ , A.M.N.H. 533.	
Valcour formation, Chazy, Rouses Point (15') Quadrangle, N. Y.	
D. <i>Rostricellula plena atilis</i> (Hall).....	646
(20-24) Respectively posterior, anterior, side, pedicle, and brachial views of Hall's type, $\times 1$ , A.M.N.H. 532/1.	
Horizon and locality same as preceding.	
E. <i>Rostricellula raymondi</i> Cooper, new species.....	647
(25-29) Respectively pedicle, posterior, side, anterior, and brachial views of a complete specimen, $\times 1$ , paratype, Carnegie Mus. 2174; (30-34) respectively side, posterior, pedicle, anterior, and brachial views of a specimen larger than the preceding, $\times 1$ , holotype, Carnegie Mus. 2176.	
St. Martin formation, St. Martins Junction, near Montreal, Quebec, Canada.	
F. <i>Rostricellula raymondi</i> Cooper, new species.....	647
(35) Posterior view of an inner filling showing septum, dental plates, and filling of cruralium without a cardinal process, $\times 3$ , paratype, Carnegie Mus. 2175.	
Horizon and locality same as preceding.	
G. <i>Lepidocyclus</i> sp. 1.....	658
(36) Brachial interior, $\times 2$ , showing cardinal process, crura with hooks, sockets and socket ridges, figured specimen, 117209a; (37) pedicle interior showing "concave deltidial plates," small foramen, teeth, and large muscle area, $\times 2$ , figured specimen, 117209b.	
Fernvale formation, quarry at Lawrence, southwest of Ada, Pontotoc County, Okla.	

- |    |   |             |
|----|---|-------------|
|    |   | Page<br>639 |
| H. | <i>Rostricellula major</i> (Raymond).....<br>(38-42) Respectively anterior, posterior, side, brachial, and pedicle views of the holotype, $\times 1$ , Carnegie Mus. 2171.<br>Valcour formation, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y. |             |

## PLATE 131

## ROSTRICELLULA

- |    |  |     |
|----|--|-----|
|    |  | 639 |
| A. | <i>Rostricellula minnesotensis</i> (Sardeson).....<br>(1-5) Respectively pedicle, anterior, side, brachial, and posterior views of a complete specimen, $\times 1$ , hypotype, 118035a; (6, 7) brachial and side views, $\times 2$ , of the preceding.<br>Platteville formation, 1½ miles northeast of Dixon, Dixon (15') Quadrangle, Ill.   |     |
| B. | <i>Rostricellula rostrata</i> Ulrich and Cooper.....<br>(8-12) Respectively brachial, side, pedicle, anterior, and posterior views of a complete specimen, $\times 1$ , hypotype, 117226a; (13-15) brachial, side, and pedicle views, $\times 2$ , of the preceding; (16) brachial view of another specimen, $\times 1$ , hypotype, 117226b.<br>Pierce formation, Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.   | 645 |
| C. | <i>Rostricellula tumidula</i> Cooper, new species.....<br>(17, 18, 21-23) Respectively anterior, brachial, pedicle, side, and posterior views of an imperfect specimen, $\times 1$ , paratype, 98196a; (19, 20) side and brachial views of a large specimen, $\times 1$ , holotype, 98196b; (24-27) respectively brachial, side, posterior, and pedicle views of a young specimen, $\times 1$ , paratype, 98196c.<br>Dryden formation, ½ mile west of Fullers Corner, 1 mile south-southeast of Big A Mountain, Big A Mountain (T.V.A. 204-SE) Quadrangle, Va. | 653 |
| D. | <i>Rostricellula</i> sp. 2.....<br>(28-32) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen, $\times 2$ , figured specimen, 117235.<br>Wardell formation (upper), Mannville School, Clinchport (T.V.A. 188-NW) Quadrangle, Va.   | 657 |
| E. | <i>Rostricellula ovata</i> Cooper, new species.....<br>(33-36) Anterior, brachial, pedicle, and side views, $\times 1$ , holotype, 117222; (37-39) brachial, pedicle, and side views, $\times 2$ , of the preceding.<br>Dryden formation (= Wardell part), quarry just east of Virginia Highway 70, north of Powell River, 1.6 miles south of Jonesville, Ben Hur (T.V.A. 170-NE) Quadrangle, Va.  | 642 |
| F. | <i>Rostricellula rostrata</i> Ulrich and Cooper.....<br>(40-43) Respectively pedicle, brachial, anterior, and side views of a complete specimen, $\times 1$ , hypotype, 117227; (44-46) side, brachial, and pedicle views, $\times 2$ , of the preceding specimen.<br>Horizon and locality same as preceding.  | 645 |

## PLATE 132

## ROSTRICELLULA

- |    |  |     |
|----|--|-----|
|    |  | 638 |
| A. | <i>Rostricellula elliptica</i> Cooper, new species.....<br>(1) View of the posterior of a cast of the interior, $\times 2$ , showing median septum slot and filling of cruralium without a cardinal process, paratype, 117217c; (2, 3) pedicle and anterior views of an imperfect specimen, $\times 2$ , paratype, 117217b; (4) brachial view, $\times 2$ , of the holotype, 117217a; (5) brachial view of a large specimen, $\times 2$ , paratype, 117217d. |     |



	Page
New Market formation, quarry $\frac{1}{2}$ mile west of U. S. Highway 11, north bank of Middle River, Staunton (15') Quadrangle, Va.	
B. <i>Rostricellula pristina</i> (Raymond).....	646
(6-10) Respectively anterior, posterior, side, pedicle, and brachial views of a complete specimen, $\times 2$ , hypotype, A.M.N.H. 25047/2.	
Crown Point formation, Sloop Bay, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
C. <i>Rostricellula raymondi</i> Cooper, new species.....	647
(11-15) Respectively posterior, pedicle, brachial, anterior, and side views of a complete specimen, $\times 1$ , paratype, 117225; (16-18) pedicle, side, and brachial views, $\times 2$ , of the preceding specimen.	
Crown Point or Valcour formation, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
D. <i>Rostricellula plena</i> (Hall).....	645
(19, 20) Brachial and pedicle views of a large specimen, $\times 1$ , hypotype, G.S.C. 1040.	
St. Martin formation, Montreal, Quebec, Canada.	
E. <i>Rostricellula basalaris</i> Cooper, new species.....	632
(21-25) Posterior, brachial, pedicle, side, and anterior views of a complete specimen, $\times 2$ , paratype, 111458a; (26) brachial view, $\times 1$ , of the same paratype; (27-29) pedicle, anterior, and brachial views of another specimen, $\times 2$ , paratype, 111458b.	
Mosheim formation, $\frac{1}{4}$ mile southwest of Newhope Church, Vandiver (15') Quadrangle, Ala.	
F. <i>Rostricellula basalaris</i> Cooper, new species.....	632
(30-32) Posterior, brachial, and side views of a small specimen, $\times 2$ , paratype, 111524a; (33-36) respectively posterior, side, anterior, and pedicle views of a complete specimen, $\times 2$ , paratype, 111524b; (37) brachial view of another specimen showing impression of median septum and cruralium filling, $\times 3$ , paratype, 111524c.	
Lenoir formation (conglomerate), 4 miles south of Pelham, Bessemer Iron District (15') Quadrangle, Ala.	
G. <i>Rostricellula transversa</i> Cooper, new species.....	651
(38-42) Respectively posterior, anterior, side, brachial, and pedicle views, $\times 2$ , of the holotype, 111545a.	
Bromide formation (Pooleville member—15 feet below the top), Colbert Creek SW $\frac{1}{4}$ sec. 15, T. 1 S., R. 1 E., 5 miles southwest of Davis, Murray County, Okla.	
H. <i>Rostricellula plattinensis</i> (Fenton).....	644
(43-47) Respectively anterior, side, posterior, pedicle, and brachial views of a complete specimen, $\times 1$ , hypotype, 111491; (48-51) respectively anterior, brachial, side, and pedicle views, $\times 2$ , of the preceding specimen.	
Plattin group (lower), Heck place, $1\frac{1}{2}$ miles south-southeast of River aux Vasses, Weingarten (15') Quadrangle, Mo.	

## PLATE 133

## ROSTRICELLULA

A. <i>Rostricellula triangulata</i> Cooper, new species.....	652
(1-5) Respectively posterior, anterior, side, brachial, and pedicle views, $\times 2$ , of the holotype, 111549a; (6) pedicle view, $\times 1$ , of the holotype; (7-11) respectively posterior, anterior, side, pedicle, and brachial views of a specimen smaller than the holotype, $\times 2$ , paratype, 111549b.	

- Page
- Mingan formation (60 to 75 feet above the base), Bald Island, Mingan Group, St. Lawrence River, Quebec, Canada.
- B. *Rostricellula compressa* Cooper, new species..... 634  
(12) Brachial view of a young specimen, showing delthyrium,  $\times 3$ , paratype, 111481c.
- Lebanon formation, U. S. Highway 41,  $\frac{3}{4}$  mile south of Knox Branch, 9 miles southeast of Murfreesboro, Rutherford County, Tenn.
- C. *Rostricellula variabilis* Cooper, new species..... 654  
(13-16) Respectively brachial, pedicle, anterior, and side views of a complete specimen,  $\times 1$ , paratype, 117233; (17-19) side, pedicle, and brachial views,  $\times 2$ , of the preceding.
- Ridley formation (*Fascifera* bed), 1 mile south-southeast of Cove Church, 5 miles south of Chickamauga, Kensington (T.V.A. 106-SE) Quadrangle, Ga.
- D. *Rostricellula variabilis* Cooper, new species..... 654  
(20-23) Respectively side, pedicle, brachial, and anterior views of a complete specimen,  $\times 1$ , holotype, 117232; (24-26) brachial, side, and pedicle views,  $\times 2$ , of the preceding.
- Horizon and locality same as preceding.
- E. *Rostricellula ovata* Cooper, new species..... 642  
(27-31) Respectively pedicle, brachial, side, posterior, and anterior views of a complete, nearly perfect specimen,  $\times 1$ , paratype, 111532; (32-35) respectively anterior, brachial, side, and pedicle views,  $\times 2$ , of the preceding.
- Wardell formation (above crinoid bed), Mulberry Gap, Powell Mountain, 5 miles north of Sneedville, Sneedville (T.V.A. 170-SW) Quadrangle, Tenn.
- F. *Rostricellula acutiplicata* Cooper, new species..... 630  
(36) Brachial view of a complete specimen,  $\times 1$ , paratype, 117212d; (37-41) respectively posterior, pedicle, side, anterior, and brachial views of the preceding,  $\times 2$ , showing details of ornamentation.
- Prosser formation (*Zygospira* bed), St. Paul, Minn.

## PLATE 134

## ROSTRICELLULA

- A. *Rostricellula compressa* Cooper, new species..... 634  
(1-5) Respectively anterior, brachial, side, posterior, and pedicle views,  $\times 1$ , of the holotype, 111481a; (6-9) respectively anterior, brachial, side, and pedicle views,  $\times 1\frac{1}{2}$ , of the holotype; (10) brachial view of the holotype,  $\times 2$ , showing foramen and slight marginal thickenings on its rim.
- Lebanon formation, cut on U. S. Highway 41,  $\frac{3}{4}$  mile south of Knox Branch, 9 miles southeast of Murfreesboro, Rutherford County, Tenn.
- (11-15) Respectively posterior, anterior, side, pedicle, and brachial views of an obese specimen,  $\times 1$ , paratype, 111468.
- Lebanon formation, Columbia, Tenn.
- (16) Posterior portion of pedicle interior showing dental plates,  $\times 2$ , paratype, 111462a; (17) brachial interior,  $\times 2$ , showing cruralium in normal view, paratype, 111462b; (18) brachial interior tilted to show sockets, socket plates, cruralium, and median septum,  $\times 3$ , paratype, 111462c.
- Lebanon formation, 3 miles east of Murfreesboro, Rutherford County, Tenn.
- B. *Rostricellula truncata* Cooper, new species..... 652  
(19-23) Respectively anterior, pedicle, side, brachial and posterior views of a fine specimen,  $\times 1$ , holotype, 117231; (24-26) pedicle, side, and brachial views of the holotype,  $\times 1\frac{1}{2}$ .
- Horizon and locality same as A, figs. 1-5, above.

- |   | Page |
|---|------|
| C. <i>Rostricellula parva</i> Cooper, new species.....  | 643  |
| (27-31) Respectively anterior, posterior, side, pedicle, and brachial views of the holotype, $\times 2$ , 117223a; (32) brachial view of the holotype, $\times 1$ .<br>Bromide formation (Pooleville member—middle of bed 2), Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.   |      |
| D. <i>Rostricellula ? angulata</i> Cooper, new species.....   | 632  |
| (33-37) Respectively brachial, anterior, pedicle, side, and posterior views of a complete specimen, $\times 1$ , paratype, 117214b; (38-42) respectively posterior, brachial, side, anterior, and pedicle views, $\times 1$ , of the holotype, 117214a; (43-46) respectively anterior, brachial, side, and pedicle views, $\times 1\frac{1}{2}$ , of the holotype.<br>Lower part of dark gray shale under Eureka quartzite, north-facing nose of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev. |      |
| E. <i>Rostricellula transversa</i> Cooper, new species.....   | 651  |
| (47-51) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen with damaged beak, $\times 1$ , paratype, 117229a; (52, 53) pedicle and brachial views, $\times 2$ , of the preceding specimen.<br>Bromide formation (Pooleville member), $\frac{1}{4}$ mile west of U. S. Highway 77, sec. 25, T. 2 S., R. 1 E., Carter County, Okla.   |      |

## PLATE 135

## ROSTRICELLULA

- |   |     |
|---|-----|
| A. <i>Rostricellula ainsliei</i> (N. H. Winchell).....  | 631 |
| (1-5) Respectively anterior, pedicle, side, brachial, and posterior views of a complete specimen, $\times 1$ , hypotype, 24866a.<br>Decorah formation (Spechts Ferry member), Elmira, Olmstead County, Minn.<br>(6, 7) Two views of the posterior of the brachial valve showing the long crura and their bases, $\times 3$ , hypotype, 48943a.<br>Decorah formation (Spechts Ferry member), Chatfield, Fillmore County, Minn. |     |
| B. <i>Rostricellula missouriensis</i> (Fenton and Fenton).....  | 641 |
| (8-10) Pedicle, side, and brachial views of a silicified specimen, $\times 1$ , figured specimen, 111488.<br>Barnhart (or Macy) formation, $1\frac{1}{2}$ miles north of the Chicago Summer School Camp, Weingarten (15') Quadrangle, Mo.   |     |
| C. <i>Rostricellula orientalis</i> (Billings).....  | 642 |
| (11-15) Respectively anterior, side, posterior, brachial, and pedicle views of a complete specimen, $\times 2$ , hypotype, 111490a.<br>Mingan formation, Harbor Island, Mingan Group, St. Lawrence River, Canada.   |     |
| D. <i>Rostricellula nucleolata</i> Cooper, new species.....   | 642 |
| (16-20) Respectively pedicle, posterior, brachial, anterior, and side views, $\times 1$ , of the holotype, 48984a; (21-25) respectively pedicle, posterior, brachial, side, and anterior views, $\times 2$ , of the holotype.<br>Platteville formation (lower buff = Pecatonica member), Minneapolis, Minn.   |     |
| E. <i>Rostricellula pulchra</i> Cooper, new species.....  | 646 |
| (26-30) Respectively posterior, pedicle, anterior, brachial, and side views of a complete specimen, $\times 1$ , holotype, 117224b; (31-35) respectively posterior, anterior, pedicle, brachial, and side views, $\times 2$ , of the preceding specimen.<br>Decorah formation (Guttenberg member— <i>Rhinidictya</i> bed), Mississippi River Bluffs, St. Paul, Minn.  |     |

- F. *Rostricellula wilsonae* Cooper, new species..... Page 655  
 (36-39) Respectively anterior, side, pedicle, and brachial views of a somewhat laterally compressed specimen,  $\times 1$ , paratype, 117234b; (40-44) respectively anterior, pedicle, brachial, side, and posterior views of a complete specimen,  $\times 1$ , holotype, 117234a; (45-48) respectively brachial, side, anterior, and pedicle views,  $\times 2$ , of the preceding specimen.  
 Aylmer formation (Rockcliffe member), 2 miles south of Rockland, Ontario, Canada.

## PLATE 136

## ROSTRICELLULA

- A. *Rostricellula cuneiformis* (Fenton and Fenton)..... 637  
 (1-4) Respectively side, posterior, anterior, and pedicle views of a complete specimen,  $\times 1$ , hypotype, 111484g; (5) brachial view of a complete specimen,  $\times 1$ , showing foramen, hypotype, 111484t; (6-9) respectively posterior, pedicle, brachial, and side views,  $\times 2$ , of the preceding specimen; (10, 11) pedicle and anterior views of a specimen slightly wider than the preceding,  $\times 1$ , hypotype, 111484-o; (12-15) pedicle, anterior, side, and brachial views of a young specimen,  $\times 2$ , hypotype, 111484u; (16) pedicle interior showing adductor field,  $\times 2$ , hypotype, 111484r; (17) pedicle interior showing dental plates,  $\times 2$ , hypotype, 111484a; (18) pedicle interior with part of brachial valve adhering and showing the long crural process from the brachial side,  $\times 1$ , hypotype, 111484q; (19) same view as the preceding of another specimen,  $\times 2$ , showing the brachial view of the crura, hypotype, 111484e; (20, 21) respectively  $\times 1$  and  $\times 2$  views of the brachial interior showing median septum and cruralium, hypotype, 111484d; (22) fine brachial interior showing cardinalia,  $\times 2$ , hypotype, 111484p.  
 Barnhart (or Macy) formation, on the old road 1 mile northwest of the Chicago Summer School Camp, NW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 32, T. 37 N., R. 9 E., Weingarten (15') Quadrangle, Mo.
- B. *Rostricellula rostrata* Ulrich and Cooper..... 648  
 (23-26) Respectively pedicle, anterior, posterior, and side views of a small specimen,  $\times 1$ , hypotype, 111531a; (27-29) side, pedicle, and brachial views,  $\times 1\frac{1}{2}$ , of the preceding specimen; (30-34) respectively posterior, anterior, pedicle, side, and brachial views of a complete specimen,  $\times 1$ , hypotype, 111531b.  
 Dryden formation, on old road from Lone Mountain to Tazewell, 1 $\frac{1}{2}$  miles northeast of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.
- C. *Rostricellula rostrata* Ulrich and Cooper..... 648  
 (35, 36) Pedicle and brachial views,  $\times 1$ , of the holotype, 108205a; (42) view of the pedicle beak of the holotype,  $\times 4$ , showing ridges on sides of delthyrium; (37, 38) side and posterior views,  $\times 1$ , of a large paratype, 108205c; (39, 40) anterior and pedicle views,  $\times 1$ , of another paratype, 108205b; (49) side of the preceding enlarged,  $\times 6$ , to show fine ornamentation; (41) pedicle interior tilted to show dental plates,  $\times 2$ , paratype, 108205h; (44, 45) posterior part of brachial valve tilted and in normal view,  $\times 4$ , to show the cruralium, median septum, and long crural process, hypotype, 111535; (46) another brachial interior showing the long crural process and cruralium,  $\times 4$ , paratype, 108205d.  
 Wardell formation, 7 miles southwest of Clinton, Clinton (T.V.A. 137-SW) Quadrangle, Tenn.  
 (43) Pedicle interior showing dental plates,  $\times 3$ , hypotype, 111541a; (47) brachial interior,  $\times 2$ , hypotype, 111541b; (48) brachial view of a young specimen,  $\times 2$ , hypotype, 111541c.  
 Dryden formation, 1 $\frac{1}{2}$  miles northeast of Loyston, Maynardville (15') Quadrangle, Tenn.

## PLATE 137

## ROSTRICELLULA

- |   | Page |
|---|------|
| A. <i>Rostricellula</i> ? <i>minuta</i> Cooper, new species.....  | 640  |
| (1-5) Respectively anterior, brachial, side, posterior, and pedicle views, $\times 3$ , of the holotype, 117220a; (6) brachial view of another complete specimen, $\times 3$ , paratype, 117220b.   |      |
| Hermitage formation (lower), on Tennessee Highway 53, 1 to 1 $\frac{1}{4}$ miles south-southeast of Woodbury, Woodbury (15') Quadrangle, Tenn.  |      |
| B. <i>Rostricellula subtransversa</i> Cooper, new species.....  | 650  |
| (7-11) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen, $\times 1$ , holotype, 117228b; (12-14) pedicle, brachial, and side views, $\times 2$ , of the preceding; (15, 16) respectively $\times 1$ and $\times 2$ enlargements of a brachial exterior, paratype, 117228c; (17, 18) pedicle and brachial views of a specimen larger than the two preceding ones, $\times 1$ , paratype, 117228a; (19) brachial view, $\times 2$ , of the preceding. |      |
| Written formation, $\frac{1}{2}$ mile south of Heiskell, east side of road, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.  |      |
| C. <i>Rostricellula basalaris</i> Cooper, new species.....  | 632  |
| (20-24) Respectively posterior, brachial, pedicle, side, and anterior views of a complete specimen, $\times 1$ , paratype, 111520a; (25, 26) brachial and pedicle views of another specimen, $\times 1$ , holotype, 111520b.  |      |
| Lenoir formation (3 feet above the base), east of U. S. Highway 11, $\frac{1}{8}$ mile south of the hosiery mill, Lenoir City (T.V.A. 130-SE) Quadrangle, Tenn.   |      |
| D. <i>Rostricellula basalaris</i> Cooper, new species.....  | 632  |
| (27-31) Respectively anterior, pedicle, side, brachial, and posterior views of a complete specimen, $\times 1$ , paratype, 118036; (32, 33) brachial and pedicle views, $\times 2$ , of the preceding specimen.   |      |
| Lenoir formation (in basal vaughanite and ash-weathering beds), south bank of Southern R.R., 1 $\frac{1}{2}$ miles southwest of Philadelphia, Philadelphia (T.V.A. 130-NW) Quadrangle, Tenn.  |      |
| E. <i>Rostricellula plena</i> (Hall).....   | 645  |
| (34-36) Pedicle, side, and brachial views, $\times 1$ , of a small specimen, holotype, A.M.N.H. 530/1.  |      |
| Valcour formation, Chazy, Rouses Point (15') Quadrangle, N. Y.  |      |
| F. <i>Rostricellula basalaris</i> Cooper, new species.....  | 632  |
| (37, 41) Respectively pedicle, and side views of a small specimen, $\times 1$ , paratype, 111793a; (38-40) anterior, brachial, and pedicle views of a specimen larger than the preceding, $\times 1$ , paratype, 111793b; (44-46) brachial, side, and pedicle views, $\times 2$ , of the preceding; (42, 43) pedicle and side views of a large specimen, $\times 1$ , paratype, 111793c.  |      |
| Tumbez formation, Staunton Lime Company quarry, $\frac{1}{2}$ to $\frac{3}{4}$ mile north of Virginia Highway 250, 2 miles east of Staunton, Staunton (15') Quadrangle, Va.   |      |
| G. <i>Rostricellula</i> sp. 1.....  | 656  |
| (47-51) Respectively posterior, side, anterior, brachial, and pedicle views, $\times 2$ , of the figured specimen, 117236; (52) brachial view, $\times 1$ , of same.  |      |
| Bromide formation (Pooleville member—bed E of Cooper), Spring Creek, sec. 17, T. 2 S. R. 1 W., Murray, County, Okla.  |      |
| H. <i>Rostricellula</i> cf. <i>R. transversa</i> Cooper, new species.....   | 651  |
| (53-57) Respectively brachial, anterior, posterior, pedicle, and side views of a complete specimen, $\times 1$ , figured specimen, 117230; (58-60) side, anterior, and pedicle views, $\times 2$ , of the preceding specimen.   |      |

- Bromide formation (Pooleville member), cut on Oklahoma Highway 99, 3 miles south of Fittstown, Pontotoc County, Okla.
- I. *Rostricellula orientalis* (Billings)..... 642  
 (61-64) Respectively side, posterior, brachial, and pedicle views of one of Billings' specimens,  $\times 1$ , hypotype, G.S.C. 2184; (65) brachial view,  $\times 2$ , of the same specimen.  
 Mingan formation, Harbor Island, Mingan Group, St. Lawrence River, Canada.

## PLATE 138

## OXOPLECIA, PLECTOCAMARA, RHYNCHOTREMA, ROSTRICELLULA

- A. *Rhynchotrema increbescens* (Hall)..... 628  
 (1-5) Respectively anterior, posterior, side, brachial, and pedicle views,  $\times 1$ , of the lectotype, A.M.N.H. 707/1; (6) brachial view,  $\times 2$ , of the same specimen showing slot of median septum; (7) posterior of the same,  $\times 2$ , showing strong dental plates and impression of cruralium.  
 Trenton formation, Middleville, Little Falls (15') Quadrangle, N. Y.
- B. *Oxoplecia costellata* Cooper, new species..... 540  
 (8, 9) Respectively anterior and brachial views of an imperfect specimen,  $\times 1$ , holotype, 117126.  
 Whistle Creek formation, road cut on U. S. Highway 60, 100 yards southeast of Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.
- C. *Rostricellula coliei* Cooper, new species..... 634  
 (10-14) Respectively pedicle, brachial, side, posterior, and anterior views of a nearly perfect specimen,  $\times 1$ , holotype, 117216d; (15-19) respectively anterior, posterior, pedicle, side, and brachial views of a younger specimen,  $\times 1$ , paratype, 117216a; (20-24) respectively anterior, posterior, side, brachial, and pedicle views of an obese specimen,  $\times 1$ , paratype, 117216e. Note small *Acanthocrania* on tongue of pedicle valve.  
 Decorah formation (Ion member), road cut on county road, 1.1 miles east of U. S. Highway 52, south side of Cannon Falls, Goodhue County, Minn.
- D. *Rostricellula acutiplicata* Cooper, new species..... 630  
 (25, 26) Pedicle and brachial views of a small specimen with deep sulcus,  $\times 1$ , paratype, 117212b; (29-32) respectively side, pedicle, anterior, and posterior views,  $\times 1$ , of the holotype, 117212a; (33) brachial view,  $\times 1\frac{1}{2}$ , of the holotype.  
 Prosser formation (*Zygospira* bed), St. Paul, Minn.  
 (27, 28) Brachial and pedicle views of another small specimen,  $\times 1$ , paratype, 117213b; (34-38) respectively anterior, posterior, side, brachial, and pedicle views of a large, deeply sulcate individual,  $\times 1$ , paratype, 117213a.  
 Prosser formation (*Zygospira* bed), Warsaw, Goodhue County, Minn.
- E. *Rostricellula ainsliei* (N. H. Winchell)..... 631  
 (39) View of the posterior slope of the brachial valve,  $\times 4$ , showing granules on shell, hypotype, 24866a.  
 Decorah formation (Spechts Ferry member), Elmira, Olmstead County, Minn.
- F. *Plectocamara costata* Cooper, new species..... 598  
 (40) Interior of the pedicle valve showing spondylium,  $\times 5$ , paratype, 117943a;  
 (41) interior of the brachial valve, showing cruralium,  $\times 5$ , paratype, 117943b;  
 (42) same enlarged to  $\times 10$  to show greater detail.  
 Lower Ward Cove formation,  $\frac{3}{4}$  mile southwest of Mount Eager Church, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.
- G. *Rhynchotrema wisconsinense* Fenton and Fenton..... 630  
 (43-45) Interior of a pedicle valve respectively tilted to the side, from the poste-

Page

rior, and in full view to show the large cardinal process,  $\times 3$ , hypotype, 117210a.

Decorah formation (Ion member), cut on county road 1.1 miles east of U. S. Highway 52, south side of Cannon Falls, Goodhue County, Minn.

## PLATE 139

## ROSTRICELLULA

- A. *Rostricellula minnesotensis* (Sardeson)..... 639  
 (1-5) Respectively anterior, posterior, side, brachial, and pedicle views of a small specimen,  $\times 1$ , hypotype, 117219b; (6) brachial view,  $\times 2$ , of the preceding; (7-11) respectively posterior, anterior, side, pedicle, and brachial views of a large and nearly perfect individual,  $\times 1$ , hypotype, 117219a.  
 Platteville formation (McGregor member), from a quarry on Wisconsin Highway 81, 1 mile northwest of Ellenboro, Lancaster (30') Quadrangle, Wis.
- B. *Rostricellula rotundata* Cooper, new species..... 649  
 (12-16) Respectively anterior, posterior, side, brachial, and pedicle views of a complete and perfect specimen,  $\times 1$ , the holotype, 36550a; (17) brachial view of another complete specimen,  $\times 2$ , paratype, 36550b; (18-22) respectively posterior, anterior, side, pedicle, and brachial views,  $\times 1$ , of the previous paratype.  
 Swift Current formation, St. Joseph Island in St. Marys River, Ontario, Canada.
- C. *Rostricellula varicosta* Cooper, new species..... 654  
 (23-27) Respectively brachial, anterior, pedicle, posterior, and side views of a complete specimen,  $\times 1$ , holotype, 117238a; (28-30) respectively pedicle, side, and brachial views,  $\times 2$ , of the same specimen; (31-34) respectively side, anterior, pedicle, and brachial views of another complete but narrower specimen,  $\times 1$ , paratype, 117238b; (35, 36) brachial and pedicle views,  $\times 2$ , of the same specimen.  
 Lenoir formation (Douglas Lake member), 0.65 mile southwest of Williamson Chapel, Tallassee (T.V.A. 130-SE) Quadrangle, Tenn.
- D. *Rostricellula multicostata* Cooper, new species..... 641  
 (37-41) Respectively posterior, pedicle, side, anterior, and brachial views of a large and perfect specimen,  $\times 1$ , holotype, 117221a; (42-44) respectively brachial, side, and pedicle views,  $\times 2$ , of the same specimen; (45-49) respectively posterior, brachial, pedicle, side, and anterior views of another complete specimen,  $\times 1$ , paratype, 117221e; (50) brachial view,  $\times 2$ , of the same; (51, 52) pedicle and brachial views of a partially exfoliated specimen,  $\times 1$ , paratype, 117221c; (53) anterior slope of the preceding,  $\times 3$ , showing the smooth, rounded costae.  
 Ellett formation (10 feet above the Knox dolomite), 1 mile south of Ellett, Blacksburg (15') Quadrangle, Va.
- E. *Rostricellula* sp. 3..... 657  
 (54) Brachial view of the exterior,  $\times 4$ , showing the microornamentation of the surface, figured specimen, 117237.  
 Prosser formation (lower), road cut 1.2 miles east of U. S. Highway 52, south side of Cannon Falls, Goodhue County, Minn.

## PLATE 140

## IDIOSPIRA, PROTOZYGA

- A. *Protozyga magnicostata* Cooper, new species..... 680  
 (1-4) Respectively brachial, side, pedicle, and anterior views of a complete speci-

	Page
men, $\times 4$ , holotype, 117245a; (5-8) respectively posterior, brachial, side, and pedicle views of a well-preserved individual, $\times 4$ , paratype, 117245b.	
Bromide formation (Mountain Lake member—30 to 34 feet below the top of bed 10), Tulip Creek, SW $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 25, T. 2 S., R. 1 E., Carter County, Okla.	
(9) Brachial view of a large specimen, $\times 4$ , paratype, 118040.	
Bromide formation (Mountain Lake member—bed 7), Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.	
B. <i>Protozyga rotunda</i> Cooper, new species.....	683
(10-14) Respectively side, anterior, pedicle, posterior, and brachial views, $\times 4$ , of the paratype, 111435a; (15) pedicle interior, $\times 4$ , paratype, 111435b; (16) brachial interior, $\times 4$ , showing low median septum and cardinalia, paratype, 111435c.	
Ridley formation, on U. S. Highway 27, 1 mile north of Rock Spring, Nickajack Gap (T.V.A. 113-SW) Quadrangle, Ga.	
C. <i>Protozyga loeblichii</i> Cooper, new species.....	679
(17-21) Respectively posterior, anterior, brachial, side, and pedicle views of a complete specimen, $\times 4$ , holotype, 111412a.	
Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.	
D. <i>Protozyga uniplicata</i> Cooper, new species.....	687
(22-26) Respectively anterior, posterior, brachial, side, and pedicle views of a complete specimen, $\times 4$ , paratype, 111416a.	
Benbolt formation (lower), second road cut west of L. McDavid's house, 1 mile west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.	
E. <i>Protozyga elongata</i> Cooper, new species.....	677
(27-31) Respectively anterior, brachial, side, pedicle, and posterior views of a small specimen, $\times 4$ , paratype, 117241c; (32-36) respectively posterior, anterior, side, brachial, and pedicle views of a large specimen, $\times 4$ , holotype, 117241a; (37) brachial view of a specimen intermediate in size between the two preceding and showing the foramen well, $\times 4$ , paratype, 117241b.	
Bromide formation (Mountain Lake member), ditch on the east side of the road 2,300 feet south and 2,000 feet west of the NE. corner sec. 36, T. 1 S., R. 1 E., 1 mile west of Dolese Brother's Crusher at Bromide, Johnston County, Okla.	
F. <i>Protozyga exigua</i> (Hall).....	678
(38-42) Respectively brachial, anterior, side, posterior, and pedicle views of a paratype, $\times 2$ , A.M.N.H. 714/1, 2b	
Trenton formation, Lewis County, N. Y.	
G. <i>Protozyga tumida</i> Cooper, new species.....	687
(43-47) Respectively posterior, brachial, side, anterior, and pedicle views of a complete specimen, $\times 4$ , holotype, 111440.	
Effna formation, McNutt Quarry, 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.	
H. <i>Protozyga rotunda</i> Cooper, new species.....	683
(48-52) Respectively anterior, side, pedicle, posterior, and brachial views of a complete specimen, $\times 4$ , paratype, 117248b.	
Wardell formation ( <i>Hesperorthis</i> zone), quarry on Station Creek, $\frac{1}{2}$ mile south of U. S. Highway 58, 2 miles east of Cumberland Gap, Wheeler (T.V.A. 153-SE) Quadrangle, Va.	
I. <i>Protozyga rotunda</i> Cooper, new species.....	683
(53-57) Respectively posterior, brachial, anterior, pedicle, and side views of a large	



- |  | Page |
|--|------|
| specimen, $\times 4$ , holotype, 111433a; (58) posterior of another specimen, $\times 6$ , showing beak region, paratype, 111433b.   |      |
| Wardell formation ( <i>Hesperorthis</i> zone), 0.3 mile southwest of Little Barren Church on old Tennessee Highway 33, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.  |      |
| J. <i>Protozyga rotundiformis</i> Cooper, new species.....   | 685  |
| (59-62) Respectively anterior, side, pedicle, and brachial views of a complete specimen, $\times 4$ , holotype, 117249.  |      |
| Lincolnshire formation (90 to 120 feet above the "Mosheim"), Evans Ferry section, on U. S. Highway 25E, 1 mile north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.   |      |
| K. <i>Idiospira</i> ? <i>warthini</i> Cooper, new species.....   | 692  |
| (63-67) Respectively anterior, pedicle, side, posterior, and brachial views of a somewhat laterally compressed specimen, $\times 1$ , paratype, Columbia Univ. 25919a; (68-72) respectively posterior, anterior, brachial, side, and pedicle views of an undistorted specimen, $\times 1$ , holotype, Columbia Univ. 25919b. |      |
| Wappinger formation (top), railroad cut at Pleasant Valley, Poughkeepsie (15') Quadrangle, N. Y.   |      |

## PLATE 141

## CYCLOSPIRA, PROTOZYGA, ZYGOSPIRA

- |  |     |
|--|-----|
| A. <i>Cyclospira quadrata</i> Cooper, new species.....   | 695 |
| (1-4) Respectively pedicle, anterior, brachial, and side views of a complete specimen, $\times 3$ , paratype, 117256b; (5-7) posterior, brachial, and side views of another specimen, $\times 3$ , holotype, 117256a.  |     |
| Edinburg formation (Liberty Hall facies—top), $\frac{1}{2}$ mile south of Dunkard Church, 6.9 miles S. 80° W. of Natural Bridge, Natural Bridge (15') Quadrangle, Rockbridge County, Va.   |     |
| (8-12) Respectively pedicle, posterior, side, anterior, and brachial views of a complete specimen, $\times 4$ , paratype, 117255a.   |     |
| Edinburg formation (lower <i>Nidulites</i> zone), cut on U. S. Highway 11, Hupp Hill, 1 mile north of Strasburg, Strasburg (15') Quadrangle, Va.   |     |
| B. <i>Zygospira matutina</i> Cooper, new species.....  | 672 |
| (13-17) Respectively anterior, side, posterior, brachial, and pedicle views, $\times 4$ , of the holotype, 117261.   |     |
| Little Oak formation, hill east of Leeds, Leeds (15') Quadrangle, Ala.   |     |
| C. <i>Zygospira circularis</i> Cooper, new species.....  | 670 |
| (18-21) Respectively pedicle, anterior, side, and brachial views of a complete specimen, $\times 2$ , paratype, 117259.  |     |
| Carters formation (just under the bentonite), north side of U. S. Highway 70S, 0.8 mile east of Readyville, Cannon County, Tenn.   |     |
| D. <i>Protozyga microscopica</i> Cooper, new species.....  | 681 |
| (22-24) Brachial, side, and pedicle views of a complete specimen, $\times 6$ , paratype, 117244.   |     |
| Ward Cove formation, on Virginia Highway 82, 1 $\frac{1}{4}$ miles northwest of Lebanon, Lebanon (T.V.A. 205-NE) Quadrangle, Va.   |     |
| E. <i>Cyclospira preciosa</i> Cooper, new species.....   | 694 |
| (25-27) Pedicle, brachial, and posterior views of a complete specimen, $\times 2$ , paratype, 117253a; (28-30) pedicle, brachial, and side views of another complete specimen, $\times 2$ , holotype, 117253b; (31, 32) brachial and anterior views of a large specimen, $\times 2$ , paratype, 117253c. |     |
| Edinburg formation (Lantz Mills facies—90 feet above <i>Dinorthis transversa</i> zone and 90 feet below <i>Oligorhynchia</i> zone), 0.6 mile northwest of the junction   |     |

- |  | Page |
|--|------|
| of Virginia County Highways 616 and 621, Richpatch, Eagle Rock (15') Quadrangle, Va.   |      |
| F. <i>Protozyga microscopica</i> Cooper, new species.....  | 681  |
| (33-37) Respectively posterior, anterior, side, pedicle, and brachial views, $\times 4$ , of the holotype, 117243.   |      |
| Lincolnshire formation (Hogskin member), 0.4 mile east-northeast of Red Hill, 4 $\frac{1}{2}$ miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.   |      |
| G. <i>Protozyga nasuta</i> Cooper, new species.....  | 681  |
| (38-41) Respectively pedicle, anterior, brachial, and side views of a complete specimen, $\times 4$ , holotype, 117246a.   |      |
| Whistle Creek formation, on U. S. Highway 60, 100 yards southeast of Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.  |      |
| H. <i>Protozyga uniplicata</i> Cooper, new species.....  | 687  |
| (42-45) Respectively anterior, brachial, side, and pedicle views of a well-preserved specimen, $\times 4$ , holotype, 111416b.   |      |
| Benbolt formation (lower), Brick Church, 1 $\frac{1}{2}$ miles west-southwest of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.  |      |
| I. <i>Protozyga tumida</i> Cooper, new species.....  | 687  |
| (46-50) Respectively anterior, side, pedicle, posterior, and brachial views of a well-formed specimen, $\times 4$ , paratype, 111400.  |      |
| Effna formation, McNutt Quarry, 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.   |      |
| J. <i>Protozyga nicolletti</i> (Winchell and Schuchert).....   | 682  |
| (51, 52) Side and brachial views of a complete but narrow specimen, $\times 2$ , hypotype, 49060a.   |      |
| Platteville formation, St. Charles, Winona County, Minn.   |      |
| (53-57) Respectively brachial, posterior, side, anterior, and pedicle views of a large specimen, $\times 3$ , hypotype, 24201a.  |      |
| Platteville formation, Elmira, Olmstead County, Minn.  |      |
| K. <i>Protozyga uniplicata</i> Cooper, new species.....  | 687  |
| (58-61) Respectively pedicle, side, posterior, and brachial views of complete specimen, $\times 4$ , paratype, 111414a; (62) pedicle view of another specimen in a cluster of <i>Polylophia billingsi</i> (Safford), $\times 4$ , paratype, 111414c. |      |
| Murfreesboro formation (top), west fork of Stone River, where it crosses U. S. Highway 70S, 1 $\frac{1}{2}$ miles northwest of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.  |      |
| L. <i>Protozyga superba</i> Cooper, new species.....   | 686  |
| (63, 64) Brachial and pedicle views, $\times 2$ , holotype, 111455a; (65-69) respectively anterior, side, brachial, posterior, and pedicle views of the holotype, $\times 3$ , showing the ornamentation in detail.                                  |      |
| Auburn chert, $\frac{1}{2}$ mile east of Auburn, Elsberry (15') Quadrangle, Mo.  |      |

## PLATE 142

## CYCLOSPIRA, HALLINA, PROTOZYGA, ZYGOSPIRA

- |  |     |
|--|-----|
| A. <i>Protozyga costata</i> Cooper, new species.....   | 676 |
| (1-5) Respectively posterior, anterior, side, pedicle, and brachial views of a complete specimen, $\times 4$ , holotype, 117239c.  |     |
| Bromide formation (Mountain Lake member—10 to 12 feet below top of shale), cut on Oklahoma Highway 18, sec. 11, T. 1 S., R. 3 E., 1.8 miles south of Sulphur, Murray County, Okla. |     |

	Page
B. <i>Zygospira circularis</i> Cooper, new species.....	670
(6-10) Respectively anterior, posterior, side, pedicle, and brachial views, $\times 2$ , of the holotype, 111374a.	
Carters formation (upper), near Franklin, Franklin (15') Quadrangle, Tenn.	
C. <i>Zygospira lebanonensis</i> Cooper, new species.....	671
(11-15) Respectively anterior, posterior, side, pedicle, and brachial views, $\times 3$ , of the holotype, 111377a.	
Lebanon formation, Shelbyville, Bedford County, Tenn.	
D. <i>Zygospira circularis</i> Cooper, new species.....	670
(16) Brachial interior showing imperfect spire and jugum, $\times 3$ , paratype, 111385.	
Carters formation, north side of U. S. Highway 70S, east of Hill Branch, 1 mile east of Woodbury, Woodbury (15') Quadrangle, Tenn.	
E. <i>Zygospira variabilis</i> Fenton and Fenton.....	673
(17-20) Respectively pedicle, posterior, side, and brachial views of a robust specimen, $\times 2$ , hypotype, 111387a; (21-23) side, anterior, and pedicle views of a specimen younger than the preceding, $\times 2$ , hypotype, 111387b; (24, 25) brachial interior of two specimens, one showing the cardinalia, the other showing the jugum, $\times 3$ , hypotypes, 111387e, 111387c.	
Plattin group (Macy formation—Zell member), loose on old road $\frac{3}{4}$ mile northwest of Chicago Summer School Camp, SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 32, T. 37 N., R. 9 E., Weingarten (15') Quadrangle, Mo.	
F. <i>Hallina saffordi</i> Winchell and Schuchert.....	690
(26-28) Respectively pedicle, side, and brachial views of a complete specimen, $\times 3$ , hypotype, 123356a.	
Lebanon formation (middle), on U. S. Highway 41, 9 $\frac{1}{2}$ miles southeast of Murfreesboro, Rutherford County, Tenn.	
G. <i>Protozyga exigua</i> (Hall).....	678
(29-33) Respectively anterior, posterior, side, pedicle, and brachial views of one of Hall's cotypes of <i>Protozyga exigua</i> Hall, $\times 2$ , lectotype, A.M.N.H. 714/1, 2a.	
Trenton formation, Lewis County, N. Y.	
H. <i>Zygospira recurvirostris</i> (Hall).....	673
(36) Brachial view, $\times 1$ , figured specimen, 111389; (34, 35, 37, 38) respectively anterior, pedicle, brachial, and side views, $\times 2$ , of the preceding specimen.	
Trenton formation, Martinsburg, Port Leyden (15') Quadrangle, N. Y.	
I. <i>Cyclospira ? longa</i> Cooper, new species.....	693
(39-43) Respectively anterior, posterior, side, brachial, and pedicle views, $\times 4$ , of the holotype, 111390.	
Rysedorf conglomerate, near Albany, N. Y.	
J. <i>Protozyga</i> sp. 1.....	688
(44-48) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen, $\times 4$ , figured specimen, 111392a.	
Meadow marble, 2 miles southeast of Kiser, Meadow (T.V.A. 139-NW) Quadrangle, Tenn.	
K. <i>Cyclospira parva</i> Cooper, new species.....	694
(49-53) Respectively anterior, posterior, pedicle, side, and brachial views, $\times 4$ , of the holotype, 111391a.	
Bromide formation (Pooleville member— <i>Oxoplecia gouldi</i> zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.	
L. <i>Cyclospira bisulcata</i> (Emmons).....	693
(54-58) Respectively posterior, pedicle, anterior, brachial, and side views of a well-preserved specimen, $\times 1$ , figured specimen, 88272a; (59) brachial view, $\times 2$ , of same specimen.	

- Coburg formation (upper), quarry east of Black River below Copenhagen, Carthage (15') Quadrangle, N. Y.
- M. *Cyclospira sulcata* Cooper, new species..... 696  
 (60-62, 64, 68) Respectively brachial, posterior, pedicle, side, and anterior views of a small specimen,  $\times 3$ , paratype, 111395a; (63, 65-67, 69) respectively posterior, side, anterior, pedicle, and brachial views,  $\times 3$ , of the holotype, 111395b.  
 Sevier formation, 1 mile southeast of Whitehorn, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.

## PLATE 143

## CYCLOSPIRA, FASCIFERA, HALLINA, LATICRURA, PROTOZYGA, SPHENOTRETA, ZYGOSPIRA

- A. *Protozyga profunda* Cooper, new species..... 683  
 (1) Brachial view,  $\times 1$ , of the holotype, 117247a; (2-6) respectively anterior, posterior, side, brachial, and pedicle views,  $\times 2$ , of the holotype.  
 Trenton formation, quarry near St. Francis de Salle, Montreal, Quebec, Canada.
- B. *Cyclospira quadrata* Cooper, new species..... 695  
 (7-11) Respectively posterior, side, anterior, brachial, and pedicle views of a complete specimen,  $\times 2$ , paratype, 117254.  
 Martinsburg formation (part with *Brongniartella* and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.
- C. *Hallina lirata* Cooper, new species..... 689  
 (12) Brachial view of a complete specimen,  $\times 3$ , holotype, Columbia Univ. 26401 (1056).  
 Benner-Stover formation, small quarry west of road, 1 mile south of Jacksonville, Centre Hall (15') Quadrangle, Pa.
- D. *Zygospira mediocostellata* Cooper, new species..... 672  
 (13) Brachial view of a complete specimen,  $\times 1$ , holotype, 117260a; (14-18) respectively anterior, posterior, brachial, side, and pedicle views,  $\times 2$ , of the preceding specimen.  
 Sevier formation, in wagon road just northwest of divide,  $1\frac{1}{2}$  miles from Bulls Gap, Mohawk (T.V.A. 172-NE) Quadrangle, Tenn.
- E. *Laticrura latibrachiata* Cooper, new species..... 981  
 (19-23) Respectively anterior, posterior, pedicle, brachial, and side views of a complete specimen,  $\times 2$ , paratype, 117264a; (24) pedicle interior,  $\times 2$ , paratype, 117264b.  
 Arline formation (lower), 100 yards south of the Negro Cemetery,  $\frac{1}{2}$  mile northeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- F. *Laticrura heteropleura* Cooper, new species..... 980  
 (25-29) Respectively anterior, posterior, side, pedicle, and brachial views of a complete specimen,  $\times 2$ , paratype, 117263d.  
 Little Oak formation, junction main road and Bailey Gap road, SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 13, T. 19 S., R. 2 W.,  $1\frac{3}{4}$  miles northeast of Newhope Church, Vandiver (15') Quadrangle, Ala.
- G. *Fascifera* sp. 1..... 1004  
 (30) Exterior of the pedicle valve,  $\times 3$ , figured specimen, 117321b; (31, 34) exterior and interior of the brachial valve,  $\times 4$ , figured specimen, 117321c; (32) posterior view of an imperfect specimen,  $\times 4$ , figured specimen, 117321a; (33) pedicle interior,  $\times 4$ , showing small apical plate, figured specimen, 117321d; (35, 36) normal and side views of an imperfect brachial interior,  $\times 4$ , showing brachiophore supporting plates and fulcral plates, figured specimen, 117321e.

	Page
Ward Cove formation (just above <i>Nidulites</i> ), $\frac{1}{4}$ mile west of Pounding Mill, north of U. S. Highway 19, Pounding Mill (15') Quadrangle, Va.	
H. <i>Sphenotreta acutirostris</i> (Hall).....	664
(37-40) Respectively brachial, anterior, side, and pedicle views of a complete specimen, $\times 4$ , hypotype, specimen in Carnegie Mus. (no number). Crown Point formation, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
I. <i>Protozyga elongata</i> Cooper, new species.....	677
(41-45) Respectively posterior, anterior, brachial, side, and pedicle views, $\times 6$ , of the paratype, 111408a; (46) pedicle view showing foramen, $\times 8$ , paratype, 111408b. Bromide formation (Mountain Lake member), small anticline northwest of Galbraith Hotel at Bromide, Johnston County, Okla.	
J. <i>Hallina saffordi</i> Winchell and Schuchert.....	690
(47) Slab showing several complete individuals, $\times 3$ , hypotype, 117258a. Lebanon formation, 2 $\frac{1}{2}$ miles east of Priest, Franklin (15') Quadrangle, Tenn.	
K. <i>Hallina globularis</i> Cooper, new species.....	689
(48-52) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen, $\times 4$ , holotype, 117257a. Auburn chert, $\frac{1}{2}$ mile east of Auburn, Elsberry (15') Quadrangle, Mo.	

## PLATE 144

## LATICRURA

A. <i>Laticrura pionodema</i> Cooper, new species.....	989
(1-5) Respectively posterior, anterior, side, pedicle, and brachial views of a complete specimen, $\times 2$ , paratype, 117269g; (6-10) respectively posterior, anterior, side, pedicle, and brachial views of another complete specimen, $\times 2$ , paratype, 117269-1; (11, 12) brachial and side views, $\times 1$ , of the holotype, 117272i; (13-15) brachial, side, and pedicle views, $\times 2$ , of the holotype; (16) pedicle interior, $\times 3$ , showing long dental plates, paratype, 117269i; (17) the preceding specimen, $\times 3$ , tilted to show the edge of the dental plates, the angulation in them, and the apical plate; (18) another pedicle interior showing the form of the muscle area, $\times 2$ , paratype, 117269k; (19) posterior part of the pedicle interior showing the dental plates, $\times 2$ , paratype, 117272e; (20) brachial interior, $\times 2$ , paratype, 117272g; (21) brachial interior of the preceding specimen, $\times 6$ , showing brachiophores, supporting plates, cardinal process, and thin median septum; (22) same as preceding, $\times 6$ , but tilted to show notothyrial cavity, and bases of the brachiophores; (23) brachial interior showing long brachiophores, $\times 2$ , paratype, 117269e; (24) same as preceding, $\times 4$ , showing septum, notothyrial chamber, cardinal process, and brachiophores; (25) same as preceding, $\times 6$ , showing long brachiophores in detail. Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.	
B. <i>Laticrura magna</i> Cooper, new species.....	982
(26-29) Pedicle, posterior, brachial, and side views of a complete but somewhat crushed specimen, $\times 3$ , paratype, 117268a. Oranda formation, along the railroad, $\frac{1}{2}$ mile west of Strasburg, Strasburg (15') Quadrangle, Va.	
C. <i>Laticrura pionodema</i> Cooper, new species.....	989
(30) Exterior brachial valve, $\times 2$ , paratype, 117273; (31) pedicle exterior, $\times 2$ , paratype, 117274b; (32) plasticine replica of the brachial interior, $\times 2$ , showing notothyrial chamber and long median septum; (33) impression of the brachial	

interior from which the preceding replica was prepared,  $\times 2$ , paratype, 117274a.

Edinburg formation (*Cyrtanotella* zone), just above the quarry  $\frac{1}{2}$  mile north-east of Strasburg Junction, Strasburg (15') Quadrangle, Va.

### PLATE 145

#### HIRNANTIA, HOWELLITES, LATICRURA

- A. *Laticrura latibrachiata* Cooper, new species..... 981  
 (1) Brachial interior,  $\times 2$ , paratype, 117265k; (2) another brachial interior showing the long brachiophores,  $\times 2$ , paratype, 117265a; (3) brachial view,  $\times 1$ , of the holotype, 118041a; (4-8) respectively brachial, anterior, pedicle, posterior, and side views,  $\times 2$ , of the holotype; (9) brachial view of another complete specimen,  $\times 2$ , paratype, 117265p; (10) pedicle interior,  $\times 2$ , showing form of muscle area, paratype, 117265f; (11) another pedicle interior,  $\times 3$ , showing apical plate, paratype, 117265h; (12) apical portion of pedicle valve,  $\times 6$ , showing apical plate, paratype, 117265d; (13) brachial interior showing the long bladeliike brachiophores,  $\times 4$ , paratype, 117265b.  
 Arline formation (middle), north side of wagon road in glade,  $\frac{1}{4}$  mile south-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- B. *Laticrura pionodema* Cooper, new species..... 983  
 (14) Brachial exterior of a large specimen,  $\times 3$ , paratype, 117270b; (15, 16) pedicle and brachial views of a young specimen,  $\times 4$ , paratype, 117270d; (17) brachial interior tilted to the side to show the long, bladeliike brachiophore,  $\times 4$ , paratype, 117270a; (18) same as preceding,  $\times 4$ , but seen in normal view; (19) posterior part of same specimen as in preceding but enlarged  $\times 6$  to show cardinal process, notothyrial cavity, and brachiophores.  
 Edinburg formation (base of Liberty Hall facies), 1.8 miles S.  $4^{\circ}$  W. of Bethel Church, 5.9 miles due east of Harrisonburg, Harrisonburg (15') Quadrangle, Va.
- C. *Laticrura magna* Cooper, new species..... 982  
 (20) Plasticine replica of the pedicle exterior,  $\times 2$ , holotype, 117267a; (21) plasticine replica of the brachial interior,  $\times 2$ , prepared from paratype, 117267b; (22) plasticine replica of the exterior of the brachial valve,  $\times 2$ , holotype, 117267a, counterpart of mold from which plasticine replica in fig. 20 was prepared; (23) plasticine replica of the brachial valve,  $\times 2$ , counterpart of mold used to prepare fig. 21.  
 Oranda formation, 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.
- D. *Hirnantia sagittifera* (McCoy)..... 1005  
 (24) Impression of the pedicle interior,  $\times 1$ , showing muscle area, hypotype, 23960a; (25) impression of the brachial interior,  $\times 1$ , hypotype, 23960f; (26) plasticine replica of the cardinalia,  $\times 1$ , prepared from the following; (28) impression of the brachial interior from which the preceding replica of the interior was prepared,  $\times 1$ , hypotype, 23960b; (27) plasticine replica of a laterally compressed brachial exterior,  $\times 2$ , showing costellate ornamentation, prepared from hypotype, 23960g.  
 Bala, Hirnant Valley, Wales.
- E. *Howellites* sp. .... 964  
 (29, 30) Plasticine replicas of the exterior and interior of a brachial valve,  $\times 2$ , showing the characteristic cardinalia, prepared from mold, figured specimen, 83859a.  
 Upper Ordovician (Soudleyan), Allt Fawr, Meifod District, Montgomeryshire, Wales.

## PLATE 146

CYCLOMYONIA, DALMANELLA, DIORTHELASMA, EREMOTREMA, LATICRURA,  
PAURORTHIS, PHRAGMORTHIS

	Page
A. <i>Laticrura pionodema</i> Cooper, new species.....	983
(1-3) Interior, exterior, and side views of a pedicle valve, $\times 3$ , paratype, 117271g;	
(4) brachial interior, $\times 3$ , showing long flat brachiophores, paratype, 117271b.	
Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quad-	
rangle, Ala.	
B. <i>Diorthelasma parvum</i> Cooper, new species.....	998
(5-9) Respectively anterior, brachial, posterior, pedicle, and side views of a com-	
plete specimen, $\times 4$ , holotype, 117322a; (10) brachial view of another complete	
specimen, $\times 4$ , paratype, 117322b; (11) pedicle exterior, $\times 4$ , paratype, 117322c;	
(12) brachial exterior, $\times 4$ , specimen missing; (13) pedicle exterior, $\times 4$ , of	
preceding; (14-17) respectively normal, tilted, posterior, and inclined views of	
the brachial interior, $\times 6$ , showing muscle scars, brachiophore supporting plates,	
brachiophores, and fulcral plates, paratype, 117322d; (18) pedicle interior show-	
ing the muscle scars, $\times 6$ , paratype, 117322e; (19) brachial interior showing the	
brachiophore supports and cardinal process, $\times 6$ , paratype, 117322f; (20-22)	
three views of another brachial valve showing brachiophores, supporting plates,	
and cardinal process, $\times 6$ , paratype, 117322g; (23) another brachial interior	
showing muscle scars and cardinalia, $\times 6$ , paratype, 117322h.	
Horizon and locality same as preceding.	
C. <i>Dalmanella crassicostellata</i> Cooper, new species.....	949
(24-28) Respectively anterior, side, posterior, pedicle, and brachial views, $\times 1$ ,	
of the paratype, 117361a; (29, 30) the brachial interior in normal view and	
tilted to show the brachiophore supporting plates, $\times 4$ , paratype, 117361f.	
Hermitage formation (lower), on Tennessee Highway 53, 0.7 mile south of	
Woodbury, Woodbury (15') Quadrangle, Tenn.	
D. <i>Phragmorthis buttsi</i> Cooper, new species.....	510
(31, 32) Interior and exterior of a large pedicle valve showing the pallial trunks,	
$\times 4$ , paratype, 116960a; (33, 34) exterior and interior of the brachial valve	
showing septum and cardinalia, $\times 4$ , paratype, 116960b; (35, 36) respectively	
$\times 3$ and $\times 4.5$ enlargements of a brachial interior tilted to show the median	
septum, paratype, 116960c; (37) brachial interior showing cardinalia, $\times 3$ ,	
paratype, 116960d; (38) brachial interior tilted to show the posterior edges of	
the long brachiophores, $\times 4$ , paratype, 116960h.	
Horizon and locality same as A above.	
E. <i>Paurorthis ponderosa</i> Cooper, new species.....	971
(39-43) Respectively pedicle, posterior, side, anterior, and brachial views of a	
large and complete specimen, $\times 1$ , holotype, 117294a.	
Benbolt formation (lower), 0.2 mile south of the middle fork of Moccasin	
Creek, 1½ miles south of Hansonville, Hansonville (T.V.A. 205-SW) Quad-	
rangle, Va.	
F. <i>Cyclomyonia peculiaris</i> Cooper, new species.....	975
(44-48) Respectively pedicle, posterior, brachial, side, and anterior views of a	
young, complete specimen, $\times 4$ , paratype, 117300a; (49, 50) exterior and interior	
of a young pedicle valve showing the callosity anterior to the muscle area and	
the pallial marks on each side of it, $\times 4$ , paratype, 117300b; (51, 52) side and	
exterior views of an adult pedicle valve, $\times 2$ , holotype, 117300c; (53) interior of	
the preceding pedicle valve, $\times 3$ , showing callosity anterior to muscle area;	
(54) interior of an imperfect pedicle valve showing the callosity anterior to the	
muscle area, $\times 2$ , paratype, 117300d; (55, 56) exterior and interior of a brachial	

valve,  $\times 4$ , paratype, 117300e; (57) imperfect brachial interior showing median ridge and muscle scars,  $\times 3$ , paratype, 117300f; (58) brachial interior showing cardinalia,  $\times 4$ , paratype, 117300g; (59) posterior part of a large brachial valve showing the adult cardinalia,  $\times 4$ , paratype, 117300h; (60, 61) two small brachial valves showing muscle scars and genital markings,  $\times 4$ , paratypes, 117300i, 117300j.

Horizon and locality same as A above.

- G. *Eremotrema biconvexum* Cooper, new species..... 960

(62) Imperfect pedicle interior showing muscle scars and pallial marks,  $\times 3$ , paratype, 117349.

Horizon and locality same as E above.

PLATE 147

REUSCHELLA

- A. *Reuschella* cf. *R. americana* Cooper, new species..... 976

(1) Exterior of the pedicle valve,  $\times 1$ , figured specimen, 117346a; (2) plasticine replica of the brachial valve,  $\times 1$ , prepared from figured specimen, 117346b; (3) impression of the pedicle interior,  $\times 1$ , figured specimen, 117346c; (4, 5) respectively  $\times 1$  and  $\times 2$  views of a plasticine replica of the brachial cardinalia, prepared from mold, figured specimen, 117346d; (6) impression from which the preceding was prepared,  $\times 2$ ; (7) impression of the brachial interior,  $\times 2$ , figured specimen, 117346e.

Jacksonburg formation,  $1\frac{1}{2}$  miles south of Annandale, Hunterdon County, N. J.

- B. *Reuschella americana* Cooper, new species..... 976

(8) Exterior of the brachial valve,  $\times 1$ , plasticine replica of mold, paratype, 110840f; (9) plasticine replica of the pedicle exterior,  $\times 1$ , holotype, mold 110840b; (10) plasticine replica of another pedicle exterior,  $\times 1$ , paratype, mold 110840a; (11) plasticine replica of the brachial exterior,  $\times 1$ , paratype, mold 110840w; (12) impression of the pedicle interior,  $\times 1$ , paratype, 110840c; (13) rubber replica of the pedicle interior showing the dental plates,  $\times 1$ , prepared from paratype, 110840e; (14) impression of the pedicle interior,  $\times 1$ , showing the slots of the dental plates and the muscle area, counterpart of holotype, 110840b; (15) enlargement of an impression of the pedicle muscle area,  $\times 2$ , paratype, 110840d; (16) impression of the brachial interior,  $\times 1$ , paratype, 110840i; (17) posterior part of preceding enlarged  $\times 2$  to show details of the impression of the cardinalia; (18) rubber replica of the cardinalia,  $\times 2$ , prepared from the preceding mold; (19) impression of the interior of another brachial valve,  $\times 1$ , paratype, 110840g; (20) rubber replica of the cardinalia of the preceding mold,  $\times 2$ .

Oranda formation, 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.

PLATE 148

Genus and species undet., PHRAGMORTHIS, REUSCHELLA

- A. Genus and species undet..... 1006

(1, 2) Respectively  $\times 2$  and  $\times 1$  enlargements of an impression of the pedicle interior, figured specimen, 117068b; (3, 4) respectively  $\times 1$  and  $\times 2$  enlargements of an impression of the brachial interior, figured specimen, 117068a.

Athens formation (base),  $2\frac{1}{2}$  miles south-southeast of Riceville, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.

- B. *Phragmorthis buttsi* Cooper, new species..... 510

(5) Exterior of the pedicle valve,  $\times 3$ , paratype, 116947b; (6) pedicle interior



tilted to show callosity anterior to muscle area,  $\times 3$ , paratype, 116947a; (7) pedicle interior,  $\times 3$ , showing teeth, paratype, 116947c; (8, 9) interior and exterior of a specimen preserving both valves in contact but broken through the middle, showing high median septum and long, slender brachiophore,  $\times 4$ , paratype, 116947i; (10) brachial interior,  $\times 6$ , showing deep notothyrial cavity with traces of cardinal process and strong median septum, paratype, 116947h; (11) same specimen as preceding,  $\times 6$ , but tilted to the side to show high median septum and long brachiophore.

Edinburg formation (base of Liberty Hall facies, just above Botetourt formation), 1.8 miles S.  $4^{\circ}$  W. of Bethel Church, 5.9 miles due east of Harrisonburg, Harrisonburg (15') Quadrangle, Va.

- C. *Phragmothris buttsi* Cooper, new species..... 510  
 (12-17) Respectively anterior, side, posterior, brachial, pedicle, and brachial tilted so as to show delthyrium,  $\times 2$ , holotype, 116959m; (18) pedicle interior,  $\times 2$ , showing form of muscle area and callosity anterior to it and pallial trunks bounding it, paratype, 116959k; (19) brachial interior,  $\times 2$ , paratype, 116959h; (20) same as preceding,  $\times 4$ , showing deep notothyrial cavity; (21) preceding specimen,  $\times 4$ , tilted to show high median septum and elevated plates under adductor field and long brachiophore; (22) same as preceding,  $\times 4$ , showing plates under adductor field and small cardinal process; (23) brachial interior tilted to show high median septum and long brachiophores,  $\times 3$ , paratype, 116959-l; (24) another brachial interior tilted to show the long brachiophores and adductor plates,  $\times 3$ , paratype, 116959d; (25, 26) pedicle interior in normal view and tilted to show form of muscle area and callosity anterior to it,  $\times 4$ , paratype, 116959b.
- Efna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- D. *Reuschella edsoni* (Bassler)..... 978  
 (27) Exterior of a partially exfoliated pedicle valve,  $\times 1$ , paratype, 66169c; (28) partially exfoliated pedicle valve showing an impression of the muscle area,  $\times 1$ , lectotype, 66169d; (29) exterior of an exfoliated brachial valve,  $\times 1$ , paratype, 66169b.
- Trenton Group (Sherman Fall formation), Shipyard Bay, Highgate Springs, St. Albans (15') Quadrangle, Vt.

## PLATE 149

## FASCIFERA, LATICURRA, PAURORTHIS

- A. *Fascifera dalmanelloidea* Cooper, new species..... 999  
 (1-3) Pedicle, side, and brachial views of a complete specimen,  $\times 2$ , paratype, 117308.  
 Bromide formation (Mountain Lake member—top of bed 10),  $\frac{1}{4}$  mile west of U. S. Highway 77, NW  $\frac{1}{4}$  sec. 25, T. 2 S., R. 1 E., Carter County, Okla.
- B. *Laticurra latibrachiata* Cooper, new species..... 981  
 (4-8) Respectively posterior, brachial, side, pedicle, and anterior views of a complete specimen,  $\times 2$ , paratype, 117264c; (9) posterior view of the preceding,  $\times 3$ , showing apical plate.  
 Arline formation (lower), 100 yards southwest of the Negro Cemetery,  $\frac{1}{2}$  mile northeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- C. *Paurorthis magna* Cooper, new species..... 969  
 (10-14) Respectively pedicle, brachial, side, anterior, and posterior views of a complete specimen,  $\times 1$ , paratype, 117291b; (16, 18) side and brachial views of a complete specimen,  $\times 1$ , paratype, 117291a.

Lincolnshire formation, Clinch Valley at Shiloh Church, Pressmens Home (T.V.A. 171-NE) Quadrangle, Tenn.

(15, 17, 19) Brachial, pedicle, and side views of a complete specimen,  $\times 1$ , paratype, 117286q; (20, 21) respectively  $\times 1$  and  $\times 2$  enlargements of a complete specimen seen from the brachial side, holotype, 117287b; (22) brachial view of another complete specimen,  $\times 1$ , paratype, 117287a; (23) pedicle interior,  $\times 2$ , showing thickened adductor area and pallial sinuses, paratype, 117286a; (24) brachial interior of a young specimen,  $\times 3$ , paratype, 117286c; (25) brachial interior of an old specimen showing adductor scars and thickened brachiophores and cardinal process,  $\times 3$ , paratype, 117286b.

Lincolnshire formation (Hogskin member),  $\frac{1}{2}$  mile north and northwest of Eidson, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.

- D. *Paurorthis fascifera* Cooper, new species..... 966  
(26-29) Pedicle, anterior, side, and brachial views of a complete specimen,  $\times 2$ , holotype, 117281a.

Ward Cove formation, Inskip, military coordinates E.2, 604, 600-700/N 596, 350, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.

- E. *Paurorthis magna* Cooper, new species..... 969  
(30) Brachial view of the complete specimen,  $\times 2$ , paratype, 117289a; (31, 32) exterior and interior of the pedicle valve,  $\times 2$ , of the preceding; (33) brachial interior,  $\times 2$ , of the preceding.

Lincolnshire formation (Hogskin member), on the road to Washburn, 3 miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.

- F. *Paurorthis magna* Cooper, new species..... 969  
(34) Exterior of the pedicle valve,  $\times 1$ , paratype, 117292a; (35-38) respectively brachial, side, posterior, and pedicle views of a complete specimen,  $\times 1$ , paratype, 117292b; (39) brachial view,  $\times 2$ , of the preceding specimen; (42) brachial interior of a large specimen,  $\times 2$ , 117292d missing; (43) interior of the pedicle valve,  $\times 2$ , paratype, 117292c.

Lincolnshire formation (Hogskin member), Sally Cleveland Farm,  $\frac{3}{4}$  mile southwest of Washburn, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.

(40, 41) Brachial interior and exterior,  $\times 2$ , paratype, 117288.

Lincolnshire formation (Hogskin member), 0.4 mile east-northeast of Red Hill,  $4\frac{1}{4}$  miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.

- G. *Paurorthis ponderosa* Cooper, new species..... 971  
(44, 45) Brachial and side views of a complete specimen,  $\times 1$ , paratype, 117294b.

Benbolt formation (base), 0.2 mile south of middle fork of Moccasin Creek,  $1\frac{1}{2}$  miles due south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.

(46-48) Brachial, pedicle, and side views of a complete specimen,  $\times 1$ , paratype, 117293.

Benbolt formation (base), west slope of hill  $\frac{1}{2}$  mile east of Cedar Point School, Hilton (T.V.A. 197-NW) Quadrangle, Va.

(49, 51) Exterior and interior of the pedicle valve,  $\times 1$ , paratype, 117295a; (50, 52) exterior and interior of the brachial valve,  $\times 1$ , paratype, 117295b; (53) brachial interior,  $\times 2$ , of the preceding specimen.

Benbolt formation, on Virginia Highway 74,  $5\frac{1}{2}$  miles east of the junction with U. S. Highway 54 (Tennessee Highway 71), Hilton (T.V.A. 197-NW) Quadrangle, Va.

## PLATE 150

## PAURORTHIS

- A. *Paurorthis longa* Cooper, new species..... Page 968  
 (1-5) Respectively pedicle, anterior, side, posterior, and brachial views of a complete specimen,  $\times 2$ , holotype, 117282b; (6) brachial view of another complete specimen,  $\times 2$ , paratype, 117282a; (7) side view of a third specimen,  $\times 2$ , paratype, 117282i; (8) pedicle interior,  $\times 2$ , showing deep delthyrial cavity, paratype, 117282g; (9) pedicle interior showing ridge extending anteriorly from the front margin of the muscle area,  $\times 2$ , paratype, 117282j; (10) another pedicle interior, showing the teeth, their fossettes, and anterior median ridge,  $\times 2$ , paratype, 117282c; (11) brachial interior,  $\times 2$ , showing adductor pits and brachiophores, paratype, 117282k; (12, 13) exterior and interior of the brachial valve,  $\times 3$ , paratype, 117282e; (14) brachial interior of an obese specimen,  $\times 2$ , showing deeply inset adductor scars and thickened brachial plates, paratype, 117282h; (16) fine brachial interior,  $\times 3$ , showing cardinalia, paratype, 117282f.  
 Arline formation, 100 yards southwest of the Negro Cemetery  $\frac{1}{2}$  mile north-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.  
 (15) Brachial interior, showing cardinalia,  $\times 3$ , paratype, 117283d.  
 Arline formation, north side of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- B. *Paurorthis fasciculata* Cooper, new species..... 965  
 (17) Brachial view,  $\times 1$ , of the holotype, 117280a; (18-22) respectively side, anterior, posterior, brachial, and pedicle views,  $\times 2$ , of the preceding specimen; (23, 24) respectively  $\times 2$  and  $\times 3$  views of the pedicle interior, showing the pallial sinuses exceptionally well developed, paratype, 117280b.  
 Little Oak formation, intersection of the Bailey Gap road with the main road,  $1\frac{3}{4}$  mile northeast of Newhope Church, SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 13, T. 19 S., R. 2 W., Vandiver (15') Quadrangle, Ala.
- C. *Paurorthis* sp. I..... 973  
 (25-29) Respectively anterior, side, posterior, brachial, and pedicle views,  $\times 2$ , of a figured specimen, 117299a; (30) the preceding,  $\times 1$ , in brachial view.  
 Athens formation (base), 600 feet S. 40° E. of the railroad and highway crossing 1 mile northeast of Athens Courthouse, Athens (T.V.A. 125-NE) Quadrangle, Tenn.  
 (31, 32) Respectively  $\times 1$  and  $\times 2$  enlargements of an impression of the brachial interior showing the adductor scars and anterior pallial trunks, figured specimen, 117298a; (33) another brachial interior impression showing the muscle scars and pallial sinuses,  $\times 2$ , figured specimen, 117298b; (34) another brachial interior impression,  $\times 2$ , figured specimen, 117298c; (35) impression of the pedicle interior,  $\times 2$ , showing pallial trunks, figured specimen, 117298d; (36) another pedicle interior impression, showing the pallial and muscle marks,  $\times 2$ , figured specimen, 117298e; (37) exterior,  $\times 2$ , of the preceding.  
 Athens formation (base), just east of the road junction, 2 $\frac{1}{2}$  miles south-southeast of Riceville, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.

## PLATE 151

## PAURORTHIS

- A. *Paurorthis macrodelloidea* Cooper, new species..... 969  
 (1) Brachial view,  $\times 1$ , of the holotype, 117284a; (2-5) respectively brachial, anterior, pedicle, and side views,  $\times 2$ , of the holotype; (6) enlargement of the exterior of part of the brachial valve,  $\times 6$ , paratype, 117285.

	Page
Bromide formation (Pooleville member), zone 13, 241 feet beneath the Viola, Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.	
B. <i>Paurorthis</i> sp. 2.....	974
(7-11) Respectively posterior, anterior, side, pedicle, and brachial views of a complete specimen, $\times 2$ , figured specimen, 117302a.	
Sevier formation, $\frac{1}{4}$ mile northeast of Miser, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.	
C. <i>Paurorthis fasciculata</i> Cooper, new species.....	965
(12-16) Respectively brachial, posterior, pedicle, side, and anterior views, $\times 2$ , of the paratype, 117279a; (17) brachial view, $\times 1$ , of the paratype; (18) enlargement of the exterior of part of the same specimen, $\times 6$ , showing exopunctae on costellae.	
Arline formation (middle), north side of wagon road in glade, $\frac{1}{4}$ mile south-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
D. <i>Paurorthis parva</i> (Pander).....	971
(19) Brachial interior, $\times 3$ , showing brachiophores and supporting tissue under them, figured specimen, 52314h.	
Walchow formation (B 11), vicinity of Leningrad, Russia.	
E. <i>Paurorthis spinosa</i> Cooper, new species.....	972
(20-24) Respectively anterior, posterior, side, pedicle, and brachial views of a complete specimen, $\times 2$ , holotype, 117297.	
Edinburg formation (middle <i>Nidulites</i> zone), Tumbling Run, $1\frac{1}{2}$ miles south-west of Strasburg, Strasburg (15') Quadrangle, Va.	
F. <i>Paurorthis ponderosa</i> Cooper, new species.....	971
(25) Brachial view of a complete specimen, $\times 1$ , paratype, 117296a; (26-29) respectively posterior, brachial, side, and pedicle views, $\times 2$ , of the preceding specimen.	
Shippensburg formation ( <i>Echinospaerites</i> zone), cut on U. S. Highway 40, west side of Conococheague Creek, 7 miles west of Hagerstown, Williamsport (15') Quadrangle, Md.	
G. <i>Paurorthis catawbensis</i> Butts.....	964
(30) Plasticine replica of the pedicle exterior, $\times 2$ , hypotype, 117276a; (31) plasticine replica of the brachial exterior, $\times 2$ , hypotype, 117276b; (32) plasticine replica of another brachial exterior, $\times 2$ , lectotype, 99259c; (33) slab showing impression of pedicle and brachial valves, $\times 2$ , hypotype, 117276c; (34) impression of the pedicle valve showing muscle tracks, $\times 2$ , hypotype, 117276d; (35) impression of the brachial interior, $\times 2$ , hypotype, 117276e; (36) interior of the brachial valve, $\times 2$ , showing notothyrial chamber and high median septum, hypotype, 117277d.	
Botetourt formation, junction of Virginia Highways 311 and 114, $\frac{1}{2}$ mile south-west of Catawba, Salem (15') Quadrangle, Va.	

## PLATE 152

## FASCIFERA

A. <i>Fascifera subcarinata</i> Ulrich and Cooper.....	1002
(1, 4) Exterior and interior of a pedicle valve, $\times 2$ , hypotype, 123290a; (2) posterior of brachial valve showing cardinalia in side view, especially fulcral plate, $\times 3$ , paratype, 123290b; (3) posterior of brachial interior in full view, $\times 2$ , paratype, 123290c.	
Wardell formation, $\frac{1}{4}$ mile north of Emory Road, 2 miles northeast of Hall Crossroad, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.	

- (5) Pedicle exterior,  $\times 2$ , paratype, 108198b; (6) pedicle interior,  $\times 2$ , paratype, 108198f; (7) brachial interior,  $\times 2$ , holotype, 108198e; (8) brachial exterior,  $\times 2$ , paratype, 108198c; (9) brachial interior tilted to show supporting plates of brachiophores,  $\times 2$ , paratype, 108198d; (10) brachial interior,  $\times 3$ , showing lobate cardinal process and brachiophore supporting plates, paratype, 108198g; (11) same as preceding,  $\times 3$ , tilted to side to show fulcral plate; (12) brachial interior showing traces of pallial marks,  $\times 3$ , hypotype, 117313a.
- Dryden formation, vicinity of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.
- (13) Interior of brachial valve showing pallial trunks,  $\times 3$ , hypotype, 117316a.
- Dryden formation, near Tazewell, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.
- B. *Fascifera stonensis* (Safford)..... 1001
- (14-18) Respectively posterior, pedicle, side, brachial, and anterior views of a large, complete specimen,  $\times 1$ , hypotype, 117310a; (19) brachial view of the preceding,  $\times 2$ , to show ornamentation.
- Dryden formation (30 feet above marble), road along Little Sycamore Creek,  $\frac{1}{2}$  mile northeast of the west edge of the Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.
- (20) Pedicle exterior,  $\times 1$ , hypotype, 118082a; (21) same as preceding,  $\times 2$ ; (22) pedicle interior showing muscle scars,  $\times 2$ , hypotype, 118082b; (27) brachial interior,  $\times 2$ , showing brachiophore supports and cardinal process, hypotype, 117311b; (28) slab showing group of valves,  $\times 1$ , hypotype, 117311a; (30) brachial interior,  $\times 2$ , hypotype, 118082c.
- Ridley formation (*Fascifera* bed), 1 mile south-southeast of Cove Church, 5 miles south of Chickamauga, Kensington (T.V.A. 106-SE) Quadrangle, Ga.
- (23) Interior of the pedicle valve,  $\times 2$ , hypotype, 117309e; (24) brachial interior of a partially silicified specimen,  $\times 2$ , hypotype, 117309b; (29) brachial exterior,  $\times 1$ , hypotype, 117309g.
- Pierce formation, old Pierce Mill, on Tennessee Highway 10, just south of Walterhill,  $7\frac{1}{2}$  miles north-northeast of Murfreesboro, Rutherford County, Tenn.
- (25) Brachial interior tilted to the side slightly to show the long brachiophore plates, small myophore, and long shaft of the cardinal process,  $\times 3$ , hypotype, 117312a; (26) the same specimen as preceding,  $\times 3$ , tilted to show long cardinal process shaft and deep cavity formed by brachiophore plates.
- Dryden formation,  $1\frac{1}{2}$  miles northeast of Loyston, Maynardville (30') Quadrangle, Tenn.

## PLATE 153

## FASCIFERA

- A. *Fascifera subcarinata* Ulrich and Cooper..... 1002
- (1) Brachial view of a complete specimen,  $\times 1$ , hypotype, 123233a; (2-6) respectively posterior, anterior, brachial, side, and pedicle views,  $\times 2$ , of the preceding.
- Dryden formation, on the west side of the sharp loop on the road down Flint Creek, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.
- B. *Fascifera sulcata* Cooper, new species..... 1003
- (7) Brachial view of a complete specimen,  $\times 1$ , holotype, 117320a; (8, 9) pedicle and brachial views,  $\times 2$ , of the preceding specimen.
- Carters formation, near Franklin, Franklin (15') Quadrangle, Tenn.
- C. *Fascifera subcarinata* Ulrich and Cooper..... 1002
- (10-14) Respectively brachial, anterior, posterior, side, and pedicle views of a young specimen,  $\times 2$ , hypotype, 117315a; (27) brachial view of a complete speci-

men,  $\times 1$ , hypotype, 117315b; (28-32) respectively posterior, anterior, pedicle, side, and brachial views,  $\times 2$ , of the preceding specimen.

Wardell part of Dryden formation (*Hesperorthis* bed), Lloyd Carter's barn, 0.8 mile by road northeast of the school at Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

(15-18) Respectively pedicle, side, brachial, and posterior views of a complete specimen,  $\times 2$ , hypotype, 117319a; (26) brachial view,  $\times 1$ , of the same specimen as preceding.

Ridley formation (lower), 1 mile west of the courthouse in Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.

(19) Brachial exterior of a complete specimen,  $\times 1$ , hypotype, 117317d; (20-23) respectively posterior, brachial, pedicle, and anterior views,  $\times 2$ , of the preceding; (24, 25) posterior and brachial views of a specimen larger than the preceding,  $\times 2$ , hypotype, 117317a.

Ooltawah formation, west side of Missionary Ridge, Chattanooga, Chattanooga (15') Quadrangle, Tenn.

D. *Fascifera dalmanelloidea* Cooper, new species..... 999

(33-37) Respectively pedicle, brachial, side, anterior, and posterior views of a complete specimen,  $\times 2$ , holotype, 117305a; (38) brachial view of another complete specimen,  $\times 1$ , paratype, 117305b; (39) pedicle view of the preceding specimen,  $\times 2$ , partially exfoliated at the beak and showing the position of a dental plate.

Bromide formation (Mountain Lake member—upper cystid bed), west side of Mountain Lake, E $\frac{1}{2}$  sec. 22, T. 2 S., R. 1 W., Carter County, Okla.

(40, 41) Brachial and pedicle view of a complete specimen,  $\times 1$ , paratype, 117306a; (42) brachial view,  $\times 2$ , of preceding; (43) pedicle interior,  $\times 2$ , showing form of muscle area and bowed-out dental plates, paratype, 117307d; (44) brachial interior showing cardinal process and brachiophore supports,  $\times 3$ , paratype, 117307b; (47) brachial interior,  $\times 2$ , same as preceding showing cardinal process; (45) brachial interior tilted to the side to show fulcral plates and brachiophore supports,  $\times 3$ , paratype, 117307a; (46) same as preceding in normal view,  $\times 2$ , showing the brachiophore supports.

Bromide formation (Mountain Lake member—*Platycystites* bed), Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.

E. *Fascifera dalmanelloidea* Cooper, new species..... 999

(48-50) Brachial, pedicle, and side views of a complete specimen,  $\times 2$ , paratype, 117304e; (51) brachial view,  $\times 1$ , of same; (52) interior of an imperfect brachial valve,  $\times 2$ , showing brachiophore supports, paratype, 117304a; (53) another brachial interior,  $\times 2$ , paratype, 117304d.

Bromide formation (Mountain Lake member), 10 to 12 feet below the top of the purple and green shale in the cut on Oklahoma Highway 18, 1.8 miles south of Sulphur, Murray County, Okla.

#### PLATE 154

#### PIONODEMA

A. *Pionodema circularis* (N. H. Winchell)..... 987

(1-5) Respectively pedicle, posterior, side, anterior, and brachial views of a complete specimen,  $\times 1$ , hypotype, 117323.

Decorah formation (Ion member), St. Paul, Minn.

B. *Pionodema circularis* (N. H. Winchell)..... 987

(6) Brachial view of a complete specimen,  $\times 1$ , hypotype, 48683; (7-11) respec-

- |   | Page |
|---|------|
| tively brachial, side, anterior, posterior, and pedicle views, $\times 2$ , of the same specimen as the preceding.  |      |
| Decorah formation (Ion member), 8 miles south of Cannon Falls, Goodhue County, Minn.  |      |
| C. <i>Pionodema conradi</i> (N. H. Winchell).....   | 988  |
| (12, 13) Brachial and side views of a complete specimen, $\times 1$ , hypotype, 15749a;   |      |
| (14) brachial view, $\times 2$ , of the preceding.  |      |
| Platteville formation, Beloit, Rock County, Wis.  |      |
| D. <i>Pionodema minnesotensis</i> Cooper.....   | 990  |
| (15-19) Respectively anterior, posterior, brachial, side, and pedicle views of a complete specimen, $\times 1$ , hypotype, 117327a.   |      |
| Decorah formation (Ion member ?), Fountain, Fillmore County, Minn.  |      |
| E. <i>Pionodema minneapolis</i> (N. H. Winchell) = <i>P. subaequata</i> (Conrad).....   | 992  |
| (20-24) Respectively pedicle, posterior, side, anterior, and brachial views of a complete specimen, $\times 1$ , hypotype, 48681a.  |      |
| Decorah formation (Spechts Ferry member ?), Minneapolis, Minn.  |      |
| F. <i>Pionodema uniplicata</i> Cooper.....  | 996  |
| (25-29) Respectively brachial, posterior, side, anterior, and pedicle views of a complete specimen, $\times 1$ , hypotype, 86571a.  |      |
| Decorah formation (Spechts Ferry member), Elmira, Olmstead County, Minn.  |      |
| (30) Pedicle interior showing form of muscle area and pallial sinuses, $\times 2$ , hypotype, 117341.   |      |
| Platteville formation ?, Janesville, Wis.   |      |
| (31, 32) Another pedicle interior, $\times 2$ , in normal view and tilted to show divergent dental plates, thickened adductor region, low median ridge, and narrow apical plate, hypotype, 117342; (33) view of the interarea, $\times 4$ , showing large teeth, delthyrium, and narrowly swollen apical plate, same as preceding.                  |      |
| Decorah formation (Spechts Ferry member), Fountain, Fillmore County, Minn.  |      |
| G. <i>Pionodema</i> sp. 1.....  | 996  |
| (34-37) Respectively brachial, side, posterior, and pedicle views of a complete specimen, $\times 2$ , figured specimen, 86583c; (38, 39) interior and exterior of a pedicle valve, $\times 2$ , figured specimen, 86583a; (40) brachial interior, showing cardinal process and short brachiophore supports, $\times 2$ , figured specimen, 86583b. |      |
| Chaumont formation, loose in bed of Black River, just below the dam at the head of the island, Watertown, N. Y.   |      |

## PLATE 155

## FASCIFERA, PAURORTHIS, PIONODEMA

- |  |     |
|--|-----|
| A. <i>Pionodema minuscula</i> Willard.....   | 991 |
| (1) Brachial view of a small specimen, $\times 1$ , hypotype, Columbia Univ. 26405(1013)b; (2, 3) brachial and posterior views, $\times 2$ , of the preceding; (4-7) respectively brachial, anterior, side, and pedicle views of a complete and well-formed specimen, $\times 2$ , hypotype, Columbia Univ. 26405(1013)a; (8) pedicle view, $\times 1$ , of preceding; (9, 10) brachial and pedicle views of a crushed but larger specimen than the two preceding, $\times 2$ , hypotype, Columbia Univ. 26405(1013)c. |     |
| Hatter formation (Hostler member), Waterside, Everett (15') Quadrangle, Pa.  |     |

- |  | Page |
|--|------|
| B. <i>Paurorthis fasciculata</i> Cooper, new species.....  | 965  |
| (11-13) Brachial, side, and pedicle views of a complete specimen, $\times 2$ , paratype, 117280g.  |      |
| Little Oak formation, junction of Bailey Gap and main roads, $1\frac{3}{4}$ mile north-east of Newhope Church, Cahaba Valley, SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 19 S., R. 2 W., Vandiver (15') Quadrangle, Ala.  |      |
| C. <i>Pionodema subaequata</i> (Conrad).....   | 992  |
| (14-18) Respectively posterior, anterior, side, brachial, and pedicle views of a perfect specimen, $\times 1$ , hypotype, 117232.  |      |
| Barnhart formation, cut on U. S. Highway 67, 0.2 mile south of Koch Valley School, 2 miles south of Barnhart, Jefferson County, Kimmswick (15') Quadrangle, Mo.  |      |
| D. <i>Pionodema sulcata</i> Cooper, new species.....   | 994  |
| (19) Exterior of the brachial valve, $\times 2$ , paratype, 117338d; (20) brachial exterior, $\times 2$ , paratype, 117338c.   |      |
| Nealmont formation (upper shaly bed, <i>Conradella</i> fauna), southern (old) quarry of the National Lime Company, Shrader Station = Naginey, Lewistown (15') Quadrangle, Pa.  |      |
| E. <i>Pionodema sulcata</i> Cooper, new species.....   | 994  |
| (21) Brachial view of a complete and nearly perfect specimen, $\times 1$ , holotype, 117337a; (22-26) respectively brachial, anterior, side, posterior, and pedicle views, $\times 2$ , of the preceding specimen; (27, 28) respectively $\times 1$ and $\times 2$ views of the brachial interior showing pallial marks and flaring brachiophore supporting plates, paratype, 117337b. |      |
| Cave Creek formation (below the lower bentonite), on the L. and N. RR., 100 yards south of the watertank, Hagan, Rose Hill (T.V.A. 161-NE) Quadrangle, Va.   |      |
| (29) Pedicle interior, $\times 3$ , showing muscle area and short median ridge anterior to it, paratype, 117339a; (30) posterior of the brachial interior showing brachiophore supporting plates set wide apart and thin-shafted cardinal process, $\times 3$ , paratype, 117339b.   |      |
| Cave Creek formation, on U. S. Highway 58, $3\frac{1}{4}$ miles east of Cumberland Gap, Wheeler (T.V.A. 153-SE) Quadrangle, Va.  |      |
| F. <i>Fascifera subcarinata</i> Ulrich and Cooper.....   | 1002 |
| (31) Brachial interior, $\times 2$ , showing deep notothyrial cavity and subparallel brachiophore supporting plates, hypotype, 117314.   |      |
| Wardell formation (40 feet beneath <i>Hesperorthis</i> zone), Evans Ferry section, on U. S. Highway 25E, $\frac{1}{2}$ mile north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.  |      |
| G. <i>Pionodema minuscula</i> Willard.....   | 991  |
| (32-36) Respectively side, anterior, pedicle, posterior, and brachial views of a nearly perfect specimen, $\times 1$ , hypotype, 117329a; (37-41) respectively side, anterior, pedicle, posterior, and brachial views, $\times 2$ , of the preceding specimen.   |      |
| Lebanon formation, Lebanon, Wilson County, Tenn.   |      |
| (42) Brachial interior, $\times 3$ , showing muscle scars, brachiophore supports, slender cardinal process, and deep notothyrial cavity, hypotype, 117328.   |      |
| Lebanon formation, near La Vergne, Rutherford County, Tenn.  |      |

## PLATE 156

## PIONODEMA

- |  |     |
|--|-----|
| A. <i>Pionodema subaequata</i> (Conrad).....   | 992 |
| (1) Brachial view of a complete specimen, $\times 1$ , hypotype, 117335a; (2, 3) brachial and pedicle views of the preceding specimen, $\times 2$ , showing ornamentation. |     |



Auburn chert (near top), Apex Station, C. B. and Q. RR., south of Elsberry, Elsberry (15') Quadrangle, Mo.

- (4) Pedicle interior showing the elongate and subflabellate diductor scars, the narrow adductor track, and the short, flaring dental plates,  $\times 2$ , hypotype, 117336a; (6) brachial interior,  $\times 2$ , showing flaring brachiophore supports, long-shafted cardinal process and sockets, hypotype, 117336c; (7) same as the preceding,  $\times 2$ , tilted to show the brachial interarea, notothyrial cavity, myophore of the cardinal process, brachiophores, and fulcral plates; (8) same as preceding,  $\times 2$ , tilted to side to show fulcral plates; (11) brachial interior tilted to show flaring brachiophore plates,  $\times 1\frac{1}{2}$ , hypotype, 117336d; (12) cardinalia of the preceding,  $\times 3$ , showing fulcral plate and brachiophores; (9) another brachial interior,  $\times 2$ , showing the adductor scars and cardinalia, hypotype, 117336b; (10) same specimen as preceding,  $\times 2$ , tilted to side to show fulcral plate, brachiophores and their supporting plates.

Barnhart formation, cut on U. S. Highway 61, 0.2 mile south of Koch Valley School, near Barnhart, Kimmswick (15') Quadrangle, Mo.

- (5) Posterior part of brachial valve showing muscle scars, adductor track, and apical plate,  $\times 3$ , hypotype, Y.P.M. S1359; (13) thin section of part of preceding, ca.  $\times 25$ , showing endopunctae. View shows punctae concentrated into linear arrangement along the costellae. Photograph by L. G. Henbest.

Decorah formation (Guttenberg member ?), St. Paul, Minn.

#### PLATE 157

##### CRISTIFERINA, DALMANELLA, ONNIELLA, PAUCICRURA, PIONODEMA

- A. *Onniella fertilis* (Ulrich)..... 954  
 (1) Portion of the type slab showing a cluster of specimens,  $\times 1$ , type slab, 96362; (2) part of preceding specimen,  $\times 2$ ; (3) brachial and pedicle views of two specimens on the same slab as preceding,  $\times 2$ , paratypes, 96362c (brachial), 96362d (pedicle).  
 Curdsville formation, Pennington Gap, Lee County, Va.
- B. *Dalmanella rara* Cooper, new species..... 949  
 (4) Brachial interiors,  $\times 3$ , paratype, 96362e, on slab above.  
 Horizon and locality same as preceding.
- C. *Onniella fertilis* (Ulrich)..... 954  
 (5) Brachial interior,  $\times 2$ , lectotype, 96362b; (6) pedicle interior,  $\times 2$ , paratype, 96362a, both on above slab.  
 Horizon and locality same as preceding.
- D. *Pionodema subaequata* (Conrad)..... 992  
 (7-11) Respectively brachial, posterior, side, anterior, and pedicle views of a complete specimen,  $\times 1$ , hypotype, 117335b; (12-14) pedicle, anterior, and side views of a somewhat larger specimen than the preceding,  $\times 1$ , hypotype, 117335a. The brachial view and  $\times 2$  enlargements of the pedicle and brachial valves appear on pl. 156, A, figs. 1-3.  
 Auburn chert (near top), Apex Station, C. B. and Q. RR. south of Elsberry, Elsberry (15') Quadrangle, Mo.
- E. *Cristiferina cristata* Cooper, new species..... 962  
 (15, 16) Brachial and pedicle views of an imperfect specimen,  $\times 2$ , paratype, 117351a; (17) brachial interior,  $\times 2$ , paratype, 117351c.  
 Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Bland County, Va.
- F. *Paucicrura rogata* (Sardeson)..... 957  
 (18-22) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen,  $\times 2$ , figured specimen, 48701a; (23, 24) respectively  $\times 2$  and  $\times 4$

enlargements of the brachial interior showing cardinalia with brachiophores supported by swelling of shell tissue in the notothyrial cavity, figured specimen, 48701b.

Prosser formation (*Vellamo* bed), Kenyon, Goodhue County, Minn.

- G. *Cristiferina cristata* Cooper, new species..... 962  
 (25-29) Respectively posterior, anterior, side, pedicle, and brachial valves of a complete specimen,  $\times 2$ , paratype, 117353.  
 Edinburg formation (*Cyrtonotella* zone), along railroad  $\frac{1}{2}$  mile west of Strasburg, Strasburg (15') Quadrangle, Va.

PLATE 158

CRISTIFERINA, DALMANELLA

- A. *Dalmanella rara* Cooper, new species..... 949  
 (1, 3) Exterior and interior of the pedicle valve,  $\times 2$ , paratype, 117363d; (2) exterior of the brachial valve,  $\times 2$ , paratype, 117363g; (4, 5) brachial interiors showing weak development of cardinal process and deep notothyrial cavity,  $\times 2$ , paratype, 117363a, e.  
 Curdsville formation,  $\frac{1}{2}$  mile north of Sill, lat.  $36^{\circ}17'31''$ , long.  $83^{\circ}53'55''$ , White Hollow (T.V.A. 145-SW) Quadrangle, Tenn.
- B. *Cristiferina cristifera* Cooper, new species..... 963  
 (6-10) Respectively brachial, anterior, posterior, side, and pedicle views of the paratype,  $\times 2$ , 117355a; (11) brachial view of the paratype,  $\times 3$ .  
 Oranda formation (base), section near dam on north side of Shenandoah River, 1.5 miles N.  $61^{\circ}$  E. of Edinburg, Edinburg (15') Quadrangle, Va.
- C. *Cristiferina cristata* Cooper, new species..... 962  
 (12-14) Brachial, side and pedicle views of a complete specimen,  $\times 2$ , paratype, 117353.  
 Edinburg formation (*Cyrtonotella* zone),  $\frac{1}{2}$  mile west of Strasburg, Strasburg (15') Quadrangle, Va.
- D. *Dalmanella winchelli* Cooper, new name..... 953  
 (15) Exterior of the brachial valve,  $\times 2$ , figured specimen, 48758b; (16) brachial interior,  $\times 2$ , figured specimen, 48758a.  
 Decorah formation (Guttenberg member—*Rhindictya* bed), Lake Street Bridge, St. Paul, Minn.
- E. *Dalmanella costellata* Cooper, new species..... 948  
 (17-20) Respectively pedicle, brachial, side, and anterior views of a narrow-hinged individual,  $\times 2$ , paratype, 117359a; (21-25) respectively posterior, anterior, brachial, pedicle, and side views of a complete specimen,  $\times 2$ , holotype, 117359f; (26, 27) pedicle and brachial views,  $\times 1$ , of preceding specimen; (28) enlargement,  $\times 3$ , of holotype; (29) interior of the brachial valve,  $\times 3$ , paratype, 117359e.  
 Oranda formation (lower), just west of the junction of Virginia County Highways 617 = 910 and 777, on 777,  $\frac{1}{4}$  mile north-northwest of Green Mount Church, Broadway (15') Quadrangle, Va.  
 (30) Brachial impression,  $\times 2$ , showing slots produced by brachiophore supports, paratype, 117360c; (31) plasticine replica,  $\times 2$ , of the brachial interior prepared from the preceding impression; (32) brachial impression of a specimen smaller than the preceding,  $\times 2$ , showing impression of cardinalia, paratype, 117360b; (33) plasticine replica,  $\times 2$ , of the brachial interior prepared from the preceding.  
 Oranda formation (base), 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.

- |    |   |      |
|----|---|------|
|    |   | Page |
| F. | <i>Dalmanella sculpta</i> Cooper, new species.....  | 950  |
|    | (34-38) Respectively pedicle, brachial, side, posterior, and anterior views of a complete specimen, $\times 2$ , paratype, 117364a; (39) brachial view of a specimen larger than the preceding, $\times 1$ , holotype, 117364c; (40-44) respectively brachial, posterior, side, pedicle, and anterior views, $\times 2$ , of the holotype; (45) brachial interior of a small valve, $\times 3$ , paratype, 117364d; (46) another brachial interior, $\times 3$ , paratype, 117364e. |      |
|    | Martinsburg formation (part with <i>Brongniartella</i> and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.  |      |

## PLATE 159

## CRISTIFERINA, ONNIELLA, PAUCICRURA

- |    |  |     |
|----|--|-----|
|    |  | 958 |
| A. | <i>Paucicrura virginica</i> Cooper, new species.....   | 958 |
|    | (1, 2) Plasticine replicas of the brachial exterior, $\times 2$ , paratypes, 123235a, 123235b; (3) impression of the brachial interior, $\times 2$ , paratype, 123235c; (4) plasticine replica of the brachial interior, $\times 2$ , prepared from the preceding impression; (5) impression of the pedicle interior, $\times 2$ , paratype, 123235d.  |     |
|    | Edinburg formation (siltstone 30 feet above <i>Echinosphaerites</i> zone), 1½ miles south of Wadesville, Winchester (15') Quadrangle, Va.  |     |
| B. | <i>Paucicrura matutina</i> Cooper, new species.....  | 957 |
|    | (6) Brachial view, $\times 1$ , of the holotype, 111795a; (7-10) respectively side, anterior, brachial, and pedicle views, $\times 2$ , of the holotype.   |     |
|    | Edinburg formation ( <i>Cyrtonotella</i> zone), ravine at the switch ¼ mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.  |     |
|    | (11) Pedicle and brachial interiors, $\times 2$ , paratypes, 117366a, 117366b.   |     |
|    | Shippensburg formation (lower part of <i>Echinosphaerites</i> zone), railroad cut 2 miles southwest of Marion, Chambersburg (15') Quadrangle, Pa.  |     |
| C. | <i>Cristiferina</i> cf. <i>C. cristifera</i> Cooper, new species.....  | 963 |
|    | (12, 13) Respectively $\times 1$ and $\times 2$ views of a complete specimen, figured specimen, 117358a.   |     |
|    | Dark shale under Eureka quartzite, north-facing nose of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.   |     |
| D. | <i>Paucicrura subplana</i> Cooper, new species.....  | 958 |
|    | (14-18) Respectively posterior, anterior, side, pedicle, and brachial views of a complete specimen, $\times 2$ , holotype, 123237a; (19, 20) brachial and pedicle views of another complete specimen, $\times 2$ , paratype, 123237b.  |     |
|    | Martinsburg formation (part with <i>Brongniartella</i> and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.   |     |
| E. | <i>Onniella fertilis</i> (Ulrich).....   | 954 |
|    | (21-25) Respectively brachial, pedicle, side, posterior, and anterior views of a large specimen, $\times 1$ , hypotype, 117369a; (26) brachial view of the same hypotype, $\times 2$ , to show details of ornamentation; (27-31) respectively pedicle, brachial, anterior, side, and posterior views of another complete specimen smaller than the preceding, $\times 1$ , hypotype, 117369b; (32) brachial interior, $\times 1$ , hypotype, 117369c; (33) same as preceding, $\times 2$ , showing muscle scars; (35) posterior of preceding, $\times 3$ , showing short brachiophores and swellings supporting them; (34) another brachial interior, $\times 3$ , showing thickenings about the brachiophores, hypotype, 117369d. |     |
|    | Curdsville formation, on U. S. Highway 58, 3 to 3½ miles east of Cumberland Gap, Wheeler (T.V.A. 153-SE) Quadrangle, Va.   |     |

(36) Brachial interior,  $\times 3$ , showing swelling on brachiophores and the suture between, hypotype, 123238a; (37) pedicle interior,  $\times 2$ , showing elongate adductor scars, and fossettes in teeth, hypotype, 123238b.

Curdsville formation,  $\frac{1}{2}$  mile north of Sill, lat.  $36^{\circ}17'31''$ , long.  $83^{\circ}53'55''$ , White Hollow (T.V.A. 145-SW) Quadrangle, Tenn.

### PLATE 160

#### CRISTIFERINA, EREMOTREMA, PAUCICRURA

- A. *Paucicrura virginica* Cooper, new species..... 958  
 (1, 2) Pedicle and brachial views of a complete specimen,  $\times 2$ , paratype, 117367a.  
 Edinburg formation (middle *Nidulites* zone), Tumbling Run,  $1\frac{1}{2}$  miles southwest of Strasburg, Strasburg (15') Quadrangle, Va.  
 (3-5) Side, pedicle, and brachial views,  $\times 2$ , of a specimen more robust than shown in figs. 1 and 2, holotype, 117368b; (6) pedicle interior,  $\times 3$ , paratype, 117368c; (7) brachial interior,  $\times 3$ , showing brachiophores with some thickening of shell tissue to support them, paratype, 117368f; (8) brachial interior of a specimen larger than the preceding but with little supporting tissue on the brachiophores,  $\times 3$ , paratype, 117368d; (9) brachial interior still larger than the preceding showing some thickening supporting the brachiophores,  $\times 3$ , paratype, 117368e; (10) another brachial interior,  $\times 3$ , paratype, 117368g.  
 Edinburg formation (lower to middle *Nidulites* zone), cut on U. S. Highway 11, 100 yards south of Battlefield Crystal Caverns entrance, Hupp Hill, 1 mile north of Strasburg, Strasburg (15') Quadrangle, Va.
- B. *Cristiferina cristifera* Cooper, new species..... 963  
 (11-14) Respectively posterior, side, anterior, and brachial views,  $\times 2$ , of the holotype, 117356a; (15) brachial view,  $\times 1$ , of the holotype.  
 Oranda formation, north fork of the Shenandoah River N.  $61^{\circ}$  E. of Edinburg, Edinburg (15') Quadrangle, Va.
- C. *Cristiferina cristata* Cooper, new species..... 962  
 (16) Brachial view of a complete specimen,  $\times 1$ , holotype, 111794g; (17-21) respectively brachial, pedicle, posterior, anterior, and side views,  $\times 2$ , of the holotype; (24, 25) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior, paratype, 111794c; (27) brachial interior,  $\times 2$ , showing elongate ridge on the myophore, paratype, 111794d; (28) posterior of another brachial interior showing the cardinal process,  $\times 2$ , paratype, 111794b.  
 Chatham Hill formation, 1.2 miles S.  $31^{\circ}$  E. of Sharon Springs, Burkes Garden (15') Quadrangle, Va.  
 (22, 23) Pedicle and brachial views of a complete specimen,  $\times 2$ , paratype, 117352n; (26) pedicle interior showing thick teeth,  $\times 2$ , paratype, 117352-o.  
 Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Bland County, Va.
- D. *Cristiferina cristata* Cooper, new species..... 962  
 (29) Brachial exterior of a complete specimen,  $\times 3$ , paratype, 117354a; (30) brachial interior,  $\times 3$ , showing high myophore ridge, paratype, 117354b.  
 Botetourt formation (*Cybeloides* bed), opposite dam on Shenandoah River, north side, 1.5 miles N.  $61^{\circ}$  E. of Edinburg, Edinburg (15') Quadrangle, Va.
- E. *Eremotrema biconvexum* Cooper, new species..... 960  
 (31-35) Respectively posterior, anterior, side, brachial, and pedicle views,  $\times 1$ , of the holotype, 117350a; (36-40) respectively posterior, anterior, side, brachial, and pedicle views,  $\times 2$ , of the holotype; (43) brachial interior of an old specimen,  $\times 2$ , showing swellings obscuring the brachiophores and the anterior pallial marks, paratype, 117350c; (44, 45) brachial interior and posterior of brachial

valve showing swellings supporting brachiophores, and lobate cardinal process,  $\times 3$ , paratype, 117350b.

Benbolt formation (lower), south side of Mount Hagan School, Hilton (T.V.A. 197-NW) Quadrangle, Va.

- (41) Pedicle interior, showing deep and elongate notothyrial cavity and diductor scars extending anterior to it,  $\times 2$ , paratype, 117348a.

Benbolt formation (lower), 0.2 mile south of the middle fork of Moccasin Creek,  $1\frac{1}{2}$  miles due north of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.

- (42) Brachial interior,  $\times 2$ , showing thickenings on brachiophores and short-shafted cardinal process, paratype, 117347b.

Benbolt (lower), east bank of a sinkhole, 300 feet south of Lakeview Church, on Virginia Highway 71, Moll Creek (T.V.A. 196-SE) Quadrangle, Va.

### PLATE 161

#### CRISTIFERINA, DALMANELLA, ONNIELLA

- A. *Dalmanella sulcata* Cooper, new species..... 951  
 (1-5) Respectively brachial, pedicle, anterior, side, and posterior views of a large adult,  $\times 1$ , paratype, 117365b; (6) another complete specimen,  $\times 1$ , holotype, 117365a; (7-11) respectively side, posterior, anterior, pedicle, and brachial views,  $\times 2$ , of the holotype; (12) interior of the pedicle valve showing muscle region,  $\times 2$ , paratype, 123239a; (13) another pedicle interior showing dental plates,  $\times 3$ , paratype, 117365h; (14) interior of the brachial valve,  $\times 2$ , paratype, 117365f; (15) interior of another brachial valve,  $\times 2$ , showing short median ridge, paratype, 117365e; (16) interior of the brachial valve showing notothyrial chamber and cardinal process,  $\times 3$ , paratype, 117365i.  
 Hermitage formation (base), on the east side of U. S. Highways 70S and 41, 4.2 miles southeast of Nashville, Hermitage (15') Quadrangle, Tenn.
- B. *Dalmanella rara* Cooper, new species..... 949  
 (17) Brachial view,  $\times 1$ , of the holotype, 117362c; (18-22) respectively posterior, anterior, brachial, pedicle, and side views,  $\times 2$ , of the holotype.  
 Curdsville formation, on Tennessee Highway 33,  $5\frac{1}{2}$  miles northeast of Maynardville, Maynardville (T.V.A. 145-SE) Quadrangle, Tenn.
- C. *Onniella* ? *planoconvexa* Cooper, new species..... 955  
 (23-27) Respectively pedicle, brachial, side, posterior, and anterior views,  $\times 1$ , of the paratype, 117370a; (28) another complete specimen,  $\times 1$ , holotype, 117370b; (29-31, 33, 34) respectively posterior, anterior, pedicle, brachial, and side views,  $\times 2$ , of the holotype; (32) another complete specimen,  $\times 2$ , paratype, 117365c; (35) impression of the interior of a brachial valve showing slots formed by brachial process,  $\times 2$ , paratype, 117365d; (36) interior of the brachial valve showing cardinalia,  $\times 3$ , paratype, 117365e.  
 Hermitage formation (base), on Tennessee Highway 53, 0.7 to 1.5 miles south of Woodbury, Woodbury (15') Quadrangle, Tenn.
- D. *Cristiferina cristifera* Cooper, new species..... 963  
 (37) Slab showing impressions of the interior of a pedicle valve and four brachial valves,  $\times 1$ , paratype, 117357b; (38) replica of the brachial interior,  $\times 2$ , prepared from mold in upper left hand of preceding figure.  
 Oranda formation, on the Bowman Farm, 0.3 miles east of U. S. Highway 11, 1 mile southwest of Woodstock, Edinburg (15') Quadrangle, Va.

## PLATE 162

## DALMANELLA, PAURORTHIS, PIONODEMA

- |  | Page |
|--|------|
| A. <i>Pionodema conradi</i> (N. H. Winchell).....  | 988  |
| (1) Brachial view of a complete specimen, $\times 1$ , hypotype, 117325a; (2-6) respectively anterior, pedicle, side, brachial, and posterior views of the same specimen, $\times 2$ , showing details of the ornamentation.   |      |
| Platteville formation (McGregor member), on U. S. Highway 52, 2 to 3 miles north of Fountain, Goodhue County, Minn.  |      |
| B. <i>Pionodema tennesseensis</i> Cooper, new species.....   | 995  |
| (7-11) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen, $\times 1$ , holotype, 117340a; (12) brachial view of a somewhat imperfect specimen, $\times 2$ , showing ornamentation, paratype, 117340c.   |      |
| Hermitage formation (base), on the east side of U. S. Highway 70S and 41 near its junction with Spence Lane, 4.3 miles southeast of Nashville, Hermitage (15') Quadrangle, Tenn.   |      |
| C. <i>Dalmanella rara</i> Cooper, new species.....   | 949  |
| (13) Brachial view of a young, complete specimen, $\times 1$ , paratype, 117362b; (14-18) respectively anterior, side, posterior, brachial, and pedicle views, $\times 2$ , of the same specimen.  |      |
| Curdsville formation, on Tennessee Highway 33, 5½ miles northeast of Maynardville, Maynardville (T.V.A. 145-SE) Quadrangle, Tenn.  |      |
| D. <i>Paurorthis catawbensis</i> Butts.....  | 964  |
| (19, 20) Side and brachial views of a large complete specimen, $\times 1$ , hypotype, 117278a; (21) same, $\times 2$ , to show ornamentation; (22) interior of the brachial valve showing the cardinalia and median ridge, $\times 2$ , hypotype, 117278b; (23) impressions of the interior of two pedicle valves showing the muscle scars, $\times 2$ , hypotype, 117275.   |      |
| Blockhouse formation, 1.6 miles south-southwest of Toqua School, Vonore (T.V.A. 139-SW) Quadrangle, Tenn.  |      |
| E. <i>Pionodema camerata</i> Cooper, new species.....  | 986  |
| (24) Plasticine replica of the exterior of an imperfect brachial valve, $\times 2$ , paratype, 117343b; (25) plasticine replica of the exterior of a small pedicle valve, $\times 2$ , paratype, 117343i; (26) impression of the interior of a large pedicle valve showing the muscle scars and pallial impressions, $\times 2$ , paratype, 117343a; (27) impression of the brachial interior, $\times 2$ , showing notothyrial chamber and long shaft of cardinal process, paratype, 117343m; (28) plasticine replica of the brachial interior showing median ridge, and notothyrial chamber, $\times 2$ , taken from paratype, 117343c; (29) side view of the brachial interior impression, $\times 2$ , paratype, 117343j; (30) impression of a young brachial valve interior, $\times 2$ , showing notothyrial chamber, paratype, 117343-o; (31) plasticine replica of the brachial interior, $\times 2$ , prepared from mold, holotype, 117343k, showing elongated notothyrial chamber; (32) small slab showing impressions of pedicle and brachial valves, $\times 1$ , paratype, 117343a. |      |
| Sevier formation (Bacon Bend member, top, just under Bays red beds), ¼ mile northeast of Fourmile Church, Tallassee (T.V.A. 139-SE) Quadrangle, Tenn.  |      |

## PLATE 163

## APORTHOPHYLA, EICHWALDIA, INGRIA

- |  |     |
|--|-----|
| A. <i>Eichwaldia subtrigonalis</i> Billings.....   | 947 |
| (1-3) Brachial, pedicle, and side views of a complete specimen, $\times 1$ , hypotype, 92369d; (4, 5) exterior and interior of the posterior part of a pedicle valve, $\times 2$ , |     |

- hypotype, 92369f; (6) brachial interior,  $\times 2$ , showing median ridge, paratype, G.S.C. 1145d.
- Rockland formation, Paquette Rapids, Ottawa River, Canada.
- B. *Ingria cloudi* Ulrich and Cooper..... 700  
 (7-9) Brachial, pedicle, and side views of a complete specimen,  $\times 1$ , hypotype, 117559c; (10, 11) brachial and pedicle views of the preceding,  $\times 2$ , showing the ornamentation; (12) brachial view of a small specimen,  $\times 1$ , showing acute ears, hypotype, 117559e; (13) exceptionally well preserved pedicle interior,  $\times 2$ , showing ridges developed anterior to the muscle area, hypotype, 117559j; (14, 15) respectively  $\times 1$  and  $\times 2$  enlargements of another pedicle interior, showing the muscle area but only a slight development of the anterior thickenings, hypotype, 117559d; (16) brachial interior,  $\times 1$ , hypotype, 117559b; (17, 18) interior and posterior views of the brachial valve,  $\times 2$ , showing cardinal process, short median ridge, chilidium, and pallial marks, hypotype, 117559g; (19) posterior of the preceding,  $\times 4$ , showing cardinal process and chilidium covering it; (20) brachial interior,  $\times 2$ , showing pallial markings exceptionally well developed, hypotype, 117559f.
- Pogonip group (mottled zone 700 feet below the Eureka quartzite), base of first ridge east of Frenchman Flat, Las Vegas (1°) Quadrangle, Nev.
- C. *Aporthophyla tyra* Ulrich and Cooper..... 698  
 (21) Impression of the brachial valve,  $\times 2$ , showing pits left by pseudopunctae, syntype, 92866e; (22) plasticine replica of the brachial interior prepared from the preceding impression,  $\times 2$ , showing orthoid cardinalia but pseudopunctate interior surface; (23) posterior of a brachial valve showing the cardinalia,  $\times 3$ , syntype, 92866h; (24) impression of the pedicle interior,  $\times 1$ , hypotype, 117566, showing short, orthoid muscle scar.
- Upper Pogonip group (lower *Rhysostrophia* zone), about 1 mile above the entrance in Ikes Canyon, Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.

## PLATE 164

## APORTHOPHYLA, TOQUIMIA

- A. *Aporthophyla aurora* (Billings)..... 698  
 (1) Exterior of the pedicle valve,  $\times 1$ , syntype, G.S.C. 560a; (2) same enlarged  $\times 3$ , to show pits left by pseudopunctae; (3) impression of the brachial exterior,  $\times 1$ , syntype, G.S.C. 560b.
- Table Head series, Point Rich, Newfoundland.
- B. *Toquimia kirki* Ulrich and Cooper..... 698  
 (4) Pedicle view of a large specimen,  $\times 1$ , hypotype, 117567e; (5) pedicle view of an incomplete specimen,  $\times 1$ , with outline restored, hypotype, 117567j; (6) posterior of another specimen, showing the pseudodeltidium,  $\times 3$ , hypotype, 117567h; (7) plasticine replica of the pedicle interior, showing form of the muscle area indistinctly and the subperipheral rim,  $\times 1$ , prepared from the following; (9) impression of the pedicle interior showing the muscle area and the depression formed by the subperipheral rim,  $\times 1$ , hypotype, 117567a; (8) exterior of a large pedicle valve,  $\times 1$ , with outline restored, plasticine replica of the exterior prepared from impression, paratype, 91595e; (10) pedicle impression,  $\times 1$ , counterpart to preceding, showing the large subflabellate muscle area; (12) enlargement of the muscle area,  $\times 2$ , of the preceding; (11, 13) respectively  $\times 1$  and  $\times 2$  views of a plasticine replica of the brachial interior prepared from the following; (14) impression of the brachial interior prepared by dissolving the shell away from the matrix to leave the impression,  $\times 2$ , hypotype, 117567d.

Upper Pogonip group (*Rhysostrophia* zone), 1 mile above the mouth of Ikes Canyon, Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.

## PLATE 165

## TAPHRODONTA

- A. *Taphrodonta parallela* Cooper, new species..... 741  
 (1) Brachial view,  $\times 1$ , of the holotype, 117562e; (2-6) respectively brachial, pedicle, side, anterior, and posterior views,  $\times 2$ , of the holotype; (13) posterior of the holotype,  $\times 6$ , showing cardinal process, pseudodeltidium, and apical foramen; (7) pedicle interior,  $\times 3$ , showing peculiar teeth, muscle area, and pallial marks, paratype, 117562g; (8) same as preceding tilted to show fossettes in teeth and short flaring dental plates,  $\times 3$ ; (9) same view as preceding,  $\times 4$ , showing dental plates, crural fossettes, and inner subperipheral thickenings; (10) deltidial region of the preceding,  $\times 5$ , showing pseudodeltidium and plates on inside of teeth; (11) same as preceding,  $\times 2$ , showing structures in perspective; (12) another pedicle interior, tilted to show deposits on inside of teeth and delthyrium,  $\times 3$ , paratype, 117562b; (14) another pedicle interior,  $\times 2$ , showing pallial marks and muscle area, paratype, 117562h; (15) posterior of preceding tilted to look into delthyrial cavity,  $\times 4$ , showing slight median ridge at apex, deposits inside teeth, and genital marking; (16) brachial interior,  $\times 1$ , paratype, 117562i; (17) same as preceding but  $\times 2$ , showing anterior pallial markings, cardinal process, and brachiophores; (18) same view,  $\times 4$ , showing cardinalia and pallial markings in detail; (19) posterior view of the preceding,  $\times 4$ , showing the narrow cardinal process and long brachiophores; (20, 21) another and more perfect brachial interior,  $\times 3$  and  $\times 2$ , showing the wide, elevated median region and the pallial mark on each side of it, paratype, 117562f; (22) posterior of the preceding,  $\times 5$ , showing the cardinalia in greater detail.

Upper Pogonip group (upper 30 feet), 1 mile above the entrance to Ikes Canyon, Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.

## PLATE 166

## APATOMORPHA

- A. *Apatomorpha pulchella* (Raymond)..... 709  
 (1-3) Pedicle, brachial, and side views of a complete specimen,  $\times 2$ , hypotype, 110901b; (5) brachial view of another complete specimen,  $\times 1$ , hypotype, 110901a; (7, 8) pedicle interior impression and a plasticine replica prepared from it,  $\times 2$ , showing dental plates and pallial marks, hypotype, 110900a; (10, 11) another pedicle impression and the replica of the interior prepared from it,  $\times 3$ , hypotype, 110900b; (12) another pedicle interior,  $\times 3$ , showing a great development of the pallial marks, hypotype, 110900c; (13) a fourth pedicle impression,  $\times 3$ , showing muscle and pallial marks, hypotype, 110900d; (14) impression of the brachial valve,  $\times 3$ , showing pallial marks and muscle scars, hypotype, 110900e; (15) plasticine replica of the brachial interior,  $\times 2$ , prepared from hypotype, 110900f; (16) brachial impression,  $\times 2$ , from which the previous view was prepared.  
 Athens formation (base), roadside just east of intersection  $2\frac{1}{2}$  miles southeast of Riceville, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.  
 (4) Pedicle exterior,  $\times 2$ , hypotype, 110895a; (6) exterior of the brachial valve,  $\times 2$ , hypotype, 110895c; (9) pedicle interior,  $\times 3$ , hypotype, 110896a; (17, 18) brachial interiors,  $\times 2$ , hypotypes, 110896b, 110896c; (19) same as fig. 17 but enlarged  $\times 3$  to show median ridge and pallial marks, hypotype, 110896b; (20)



interior of an old brachial valve,  $\times 3$ , showing thickened cardinalia, hypotype, 110896d.

Athens formation (base), 600 feet S.  $40^\circ$  E. of the railroad-highway crossing 1 mile northeast of Athens courthouse, Athens (T.V.A. 125-NE) Quadrangle, Tenn.

## PLATE 167

## PALAEOSTROPHOMENA

- A. *Palaeostrophomena resupinata* Cooper, new species..... 704  
 (1, 4) Brachial and posterior views,  $\times 1$ , of a complete specimen, paratype, 111078c; (21) posterior of the preceding,  $\times 2$ , showing childidium and simple cardinal process; (2, 3) brachial and side views,  $\times 1$ , of another complete specimen, paratype, 111078d.  
 Benbolt formation (base),  $\frac{1}{4}$  mile east of Speers Ferry, Clinchport (T.V.A. 188-NW) Quadrangle, Va.  
 (5-7) Brachial, side, and pedicle views of a small specimen,  $\times 1$ , paratype, 117377d; (16, 17) posterior and brachial views,  $\times 2$ , of the preceding; (8, 9) another complete specimen,  $\times 1$ , pedicle and brachial views, paratype, 117377a; (19) posterior,  $\times 2$ , of the preceding; (20) brachial view,  $\times 2$ , of preceding; (11-15) respectively side, brachial, pedicle, posterior, and anterior views of a large complete specimen,  $\times 1$ , holotype, 117377h; (22, 23) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior, showing genital markings, pallial sulci, and muscle area, paratype, 117377g; (24) another pedicle valve,  $\times 3$ , showing pallial marks, paratype, 117377c; (25) a third pedicle interior,  $\times 2$ , paratype, 117377e; (26) brachial interior,  $\times 2$ , showing septa and pallial marks, companion valve to preceding pedicle valve, paratype, 117377e; (27) brachial interior showing 3 septa bundled anteriorly,  $\times 2$ , paratype, 117377f; (28) interior of an old brachial valve,  $\times 3$ , showing genital markings, pallial sinuses, and cardinalia, paratype, 117377c, companion to pedicle valve fig. 24.  
 Benbolt formation (lower), west slope of the hill  $\frac{1}{2}$  mile east of Cedar Point School, Hilton (T.V.A. 197-NW) Quadrangle, Va.  
 (10, 18) Pedicle and side views of a large specimen,  $\times 1$ , paratype, 111069a.  
 Benbolt formation, just east of meridian  $17^\circ 30''$ , east of Moccasin Creek, north edge of Mendota (T.V.A. 197-NE) Quadrangle, Va.

## PLATE 168

## GLYPTAMBONITES, PALAEOSTROPHOMENA

- A. *Glyptambonites glyptus* Cooper, new species..... 713  
 (1) Plasticine replica of the brachial interior,  $\times 2$ , from paratype, 123248a; (2) plasticine replica of the brachial exterior, showing also part of pedicle valve attached,  $\times 2$ , from paratype, 123248b.  
 Botetourt formation, 2 miles northwest of Brownsburg, Lexington (15') Quadrangle, Va .  
 B. *Palaeostrophomena angulata* Cooper, new species..... 702  
 (3) Exterior of the pedicle valve,  $\times 2$ , holotype, 111080a; (4) interior of the pedicle valve showing muscle area, pallial marks, and marginal indentations,  $\times 2$ , paratype, 111084; (5, 6) respectively  $\times 2$  and  $\times 1$  views of a wide pedicle valve showing the interior, paratype, 111080b; (7) pedicle interior showing the elongate diductor scars,  $\times 2$ , paratype, 111080c; (8) another pedicle interior,  $\times 2$ , paratype, 111080d; (9, 10) pedicle valves retaining part of the brachial valve near the beak,  $\times 2$ , paratypes, 111080e, 111080f.

Botetourt formation, cut at the junction of Virginia Highways 311 and 114,  $\frac{1}{2}$  mile west of Catawba, Salem (15') Quadrangle, Va.

- C. *Palaeostrophomena subtransversa* Cooper, new species..... 707  
 (11-13) Pedicle, side, and brachial views of a complete specimen,  $\times 1$ , the holotype, 111065g; (14-16) pedicle, brachial, and posterior views,  $\times 2$ , of the holotype; (17) brachial view of another complete specimen, smaller than the holotype,  $\times 2$ , paratype, 111065i; (18) pedicle interior showing pallial and muscle marks,  $\times 2$ , paratype, 111065e; (19) another pedicle interior,  $\times 2$ , showing good development of the pallial marks, paratype, 111065b; (20) brachial interior,  $\times 2$ , showing median septa and cardinalia, paratype, 111065h; (21) another brachial interior showing median septum, notothyrial thickening, and pallial marks,  $\times 3$ , paratype, 111065f; (22) posterior of a brachial valve showing narrow chilidium and simple cardinal process,  $\times 3$ , paratype, 111065j; (23) another brachial interior,  $\times 2$ , showing pallial marks, paratype, 111065c.

Arline formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.

#### PLATE 169

#### ISOPHRAGMA, PALAEOSTROPHOMENA, SOWERBYITES

- A. *Isophragma subabbreviatum* Cooper, new species..... 738  
 (1) Brachial view,  $\times 1$ , of the holotype, 110916a; (2, 3) posterior and brachial views,  $\times 3$ , of the holotype; (4) brachial interior,  $\times 3$ , of the holotype; (5) interior of a fragmentary pedicle valve showing anterior thickenings and pseudo-deltidium,  $\times 3$ , paratype, 110916b; (6) brachial interior,  $\times 3$ , showing median ridge, holotype; (7) same view of the same specimen,  $\times 3$ , tilted to show anterior edge of median ridge; (8) posterior of the brachial valve of the holotype,  $\times 4$ , showing the cardinal process and sockets; (9) cardinalia of the brachial valve,  $\times 4$ , of the holotype.

Arline formation (middle), north side of wagon road in glade,  $\frac{1}{4}$  mile south-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

- B. *Sowerbyites triseptatus* (Willard)..... 730  
 (10) Brachial view of a complete specimen,  $\times 2$ , hypotype, 117414b; (11) brachial interior,  $\times 2$ , showing characteristic median septum, hypotype, 117414a; (12) pedicle interior showing callosities at anterior end of long diductor scars,  $\times 2$ , hypotype, 117414c.

Lincolnshire formation (Hogskin member), U. S. Highway 25E, north of Thornhill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.

- C. *Palaeostrophomena superba* Cooper, new species..... 706  
 (13) Exterior of a pedicle valve,  $\times 2$ , paratype, 117380.

Arline formation, 1 mile northeast of Friendsville, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.

- (14, 16) Pedicle and brachial views of a complete specimen,  $\times 2$ , paratype, 111070f; (17) brachial view,  $\times 1$ , of the preceding; (15, 18) pedicle and brachial views of a specimen larger than the preceding,  $\times 2$ , holotype, 111070m; (19, 27-29) brachial, posterior, anterior, and side views,  $\times 1$ , of the holotype; (20-22) respectively  $\times 1$ ,  $\times 2$ , and  $\times 3$  views of the pedicle interior showing the muscle and pallial marks, paratype, 111070-l; (23, 24) pedicle interiors,  $\times 2$ , showing the pallial marks, paratypes, 111070p, 111070i; (25, 26) fragments of the brachial valve showing septum,  $\times 2$ , paratypes, 111070h; 111070g.

Horizon and locality same as A above.

## PLATE 170

## ISOPHRAGMA

- |  | Page |
|--|------|
| A. <i>Isophragma ricevillense</i> Cooper, new species.....   | 737  |
| <p>(1) Plasticine replica of the pedicle exterior, <math>\times 2</math>, paratype, 110923g; (2) brachial view of a complete specimen preserving its shell, <math>\times 1</math>, holotype, 110918a; (3-7) respectively brachial, pedicle, side, posterior, and anterior views, <math>\times 2</math>, of the holotype; (8) impression of the pedicle interior showing the scalloped thickenings inside the anterior margin, <math>\times 2</math>, paratype, 110923b; (9) plasticine replica of the pedicle interior prepared from the preceding, <math>\times 2</math>, and showing the anterior thickenings; (10) impression of the interior of another pedicle valve, <math>\times 2</math>, paratype, 110923a; (11) plasticine replica of the pedicle interior, <math>\times 3</math>, prepared from the preceding mold; (12) impression of the brachial interior, showing the long duplex ridge, <math>\times 2</math>, paratype, 110923c; (13) plasticine replica of the brachial interior, <math>\times 2</math>, prepared from the preceding; (14) impression of another brachial interior, <math>\times 2</math>, paratype, 110923d; (15) plasticine replica of the brachial interior prepared from the preceding mold, <math>\times 3</math>, showing the double median ridge, cardinal process, and pallial marks.</p> <p>Athens formation (base), just east of the intersection, <math>2\frac{1}{2}</math> miles south-southeast of Riceville, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.</p> |      |
| B. <i>Isophragma sulcatum</i> Cooper, new species.....   | 739  |
| <p>(16) Brachial view of a poorly preserved specimen, <math>\times 2</math>, holotype, 110917.</p> <p>Just above Lenoir formation with <i>Maclurites</i> and under the Pratt Ferry, 0.15 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.</p>   |      |
| C. <i>Isophragma extensum</i> Cooper, new species.....   | 735  |
| <p>(17) Brachial view of a complete specimen, <math>\times 2</math>, paratype, 117375.</p> <p>Little Oak formation, junction Bailey Gap and main roads, Cahaba Valley, SW<math>\frac{1}{4}</math>SW<math>\frac{1}{4}</math> sec. 13, T. 19 S., R. 2 W., <math>1\frac{1}{4}</math> miles northeast of Newhope Church, Vandiver (15') Quadrangle, Ala.</p>   |      |
| D. <i>Isophragma extensum</i> Cooper, new species.....   | 735  |
| <p>(18) Brachial view of a young specimen, <math>\times 2</math>, paratype, 117376f; (19-22) respectively anterior, pedicle, brachial, and side views of a complete, well-formed specimen, <math>\times 2</math>, holotype, 117376a; (23) posterior of the preceding, <math>\times 3</math>, showing cardinal process, chilidium, and pseudodeltidium; (24) brachial view of the preceding, <math>\times 3</math>, showing ornamentation in detail; (25) brachial view of a young and mucronate specimen, <math>\times 3</math>, paratype, 117376e; (26) interior of an old pedicle valve, <math>\times 2</math>, showing extreme thickening of the interior, paratype, 117376-l; (27) pedicle interior of a young specimen, showing anterior, subperipheral ridges, <math>\times 3</math>, paratype, 117376c; (28) another pedicle interior of a young specimen, <math>\times 3</math>, paratype, 117376k; (29) brachial interior, <math>\times 4</math>, showing duplex ridge, thick-shafted cardinal process, and brachiophores, paratype, 117376d.</p> <p>Arline formation, 100 yards southwest of the Negro Cemetery, <math>\frac{1}{2}</math> mile northeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.</p>  |      |

## PLATE 171

## GLYPTAMBONITES, ISOPHRAGMA

- |   |     |
|---|-----|
| A. <i>Isophragma extensum</i> Cooper, new species.....  | 735 |
| <p>(1) Brachial view of a young but complete specimen, <math>\times 3</math>, paratype, 110911d; (13) brachial interior, <math>\times 3</math>, showing elevated ridge, paratype, 110911a.</p> <p>Arline formation, 1,500 feet south of the mouth of Burnett Creek, Shooks Gap (T.V.A. 147-NE) Quadrangle, Tenn.</p> <p>(2) Brachial exterior of an imperfect specimen preserving both valves, <math>\times 2</math>, para-</p> |     |

type, 110912; (3, 4) brachial and pedicle views of a young specimen,  $\times 2$ , paratype, 110908g; (5, 6) respectively  $\times 2$  and  $\times 1$  views of a pedicle valve, paratype, 110908d; (8, 9) respectively  $\times 2$  and  $\times 3$  enlargements of the interior of the preceding specimen; (7) exterior of another pedicle valve,  $\times 3$ , paratype, 110908c; (10, 11) respectively  $\times 2$  and  $\times 3$  enlargements of the brachial interior, showing median ridge and thick-shafted cardinal process, paratype, 110908a; (12, 14) interior of two young brachial valves showing duplex character of septum before it is thickened and grown together,  $\times 3$ , paratypes, 110908b, 110908h.

Arline formation (middle), north side of wagon road in glade,  $\frac{1}{4}$  mile south-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

- B. *Glyptambonites musculosus* Cooper, new species..... 715  
 (15) Plasticine replica of the pedicle interior showing the complicated pallial sinuses and the elongate diductor muscles,  $\times 1$ , prepared from paratype, 117390a.  
 Oranda formation, 0.6 mile northeast of Linville Station, Broadway (15') Quadrangle, Va.
- C. *Isophragma extensum* Cooper, new species..... 735  
 (16) Brachial view of a complete specimen, with outline restored,  $\times 1$ , paratype, 110909a; (17-19) side, pedicle, and brachial views of the preceding specimen,  $\times 2$ , with outlines restored.  
 Arline formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- D. *Isophragma biseptatum* Cooper, new species..... 734  
 (20) Brachial view,  $\times 1$ , of the holotype, 110905a; (21-23) pedicle, side, and brachial views,  $\times 2$ , of the holotype; (24, 25) pedicle and brachial views of another complete specimen,  $\times 2$ , paratype, 110905c; (26, 27) respectively  $\times 1$  and  $\times 2$  enlargements of a pedicle interior, paratype, 117373a; (28) another pedicle interior,  $\times 2$ , showing subperipheral thickenings, paratype, 110905b; (29) brachial interior,  $\times 2$ , showing median ridges and cardinalia, paratype, 110905d.  
 Benbolt formation (40 feet above base), Green Valley,  $\frac{1}{4}$  mile southeast of Green Valley Church, 3 miles southwest of Lebanon, Brumley (T.V.A. 205-SE) Quadrangle, Va.
- E. *Isophragma biseptatum* Cooper, new species..... 734  
 (30) Brachial view of a complete specimen,  $\times 2$ , paratype, 117374b; (31) impression of the brachial interior,  $\times 2$ , paratype, 117374a; (32) plasticine replica of the brachial interior,  $\times 2$ , prepared from the preceding mold, showing the median septa.  
 Botetourt formation, south side of U. S. Highway 60, 1 mile northwest of Lexington, Lexington (15') Quadrangle, Va.

## PLATE 172

## HESPERONOMIELLA, PAUCICOSTELLA, PTYCHOGLYPTUS, TAFFIA

- A. *Paucicostella canadensis* Cooper, new species..... 712  
 (1) Exterior of a pedicle valve,  $\times 2$ , paratype, 117395a; (2) exterior of a fairly sulcate pedicle valve,  $\times 2$ , holotype, 117395b; (3) another pedicle valve,  $\times 2$ , paratype, 117395c; (4) exterior of the brachial valve,  $\times 2$ , paratype, 117395d; (5) a wide pedicle valve,  $\times 2$ , paratype, 117395f; (6) brachial exterior,  $\times 2$ , paratype, 117395e.  
 Boulder in Mystic conglomerate, Range 6, Lot 21, 2.6 miles north and  $\frac{1}{2}$  mile east of Mystic, Stanbridge Township, Quebec, Canada.
- B. *Ptychoglyptus ? kindlei* Cooper, new species..... 816  
 (7) Pedicle exterior,  $\times 2$ , paratype, 117392a; (8) plasticine replica of the brachial

- Page
- exterior,  $\times 2$ , paratype, 117392b; (9) another pedicle valve,  $\times 2$ , paratype, 123254a.
- Table Head series, Table Point Cove and Table Point, Newfoundland.
- C. *Ptychoglyptus ? kindlei* Cooper, new species..... 816  
 (10) Plasticine replica of the brachial valve,  $\times 2$ , paratype, 66290a; (11) plasticine replica of another brachial valve,  $\times 2$ , paratype, 66290b; (12) plasticine replica of the pedicle exterior,  $\times 2$ , holotype, 66290c.  
 Boulder in Mystic conglomerate, Range 6, Lot 20, 2½ miles north of Mystic, Quebec, Canada.
- D. *Hesperonomiella quebecensis* Cooper, new species..... 337  
 (13) Impression of the brachial interior,  $\times 1$ , showing main pallial trunks, paratype, 116849d; (14) another impression of the pedicle interior prepared by burning shell,  $\times 1$ , holotype, 116849a; (15, 16) respectively  $\times 1$  and  $\times 2$  enlargements of a plasticine replica of the pedicle interior prepared from the preceding; (17) impression of the brachial interior prepared by burning the shell,  $\times 1$ , paratype, 116849b; (18, 19) respectively  $\times 1$  and  $\times 2$  views of a plasticine replica of the brachial interior prepared from the preceding mold; (20) exterior of the brachial valve,  $\times 2$ , paratype, 116849f.  
 Boulder in Mystic conglomerate, Range 6, Lot 21, 2.6 miles north and ½ mile east of Mystic, Stanbridge Township, Quebec, Canada.
- E. *Taffia planoconvexa* Butts..... 697  
 (21) Views showing the brachial valve and the pedicle interarea,  $\times 2$ , lectotype, 71461b; (22) same as preceding,  $\times 2\frac{1}{2}$ , showing pseudodeltidium and chilidium; (23) pedicle exterior,  $\times 2$ , showing ornamentation, paratype, 71461a.  
 Odenville formation, 7 miles northeast of Pelham, St. Clair County, Ala.  
 (24) Brachial exterior showing ornamentation of an exceptionally well preserved specimen,  $\times 1\frac{1}{2}$ , hypotype, 91586; (27, 28) respectively  $\times 1\frac{1}{2}$  and  $\times 3$  views of the interior of the preceding showing notothyrial cavity with a cardinal process, short brachiophores, short median ridge, and granulose interior.  
 Odenville formation, along the railroad east of Odenville, 1,780 feet east of the highway crossing at railroad station in borrow pit, St. Clair County, Ala.  
 (25) Interior of the pedicle valve showing pallial marks,  $\times 1\frac{1}{2}$ , hypotype, 91590a; (26) median region of another pedicle interior,  $\times 1\frac{1}{2}$ , hypotype, 91590b.  
 Odenville formation, about 8 miles southwest of Leeds, SE¼NE¼ sec. 10, T. 18 S., R. 1 W., Vandiver (15') Quadrangle, Ala.  
 (29) Posterior part of the brachial interior showing the cardinalia,  $\times 3$ , hypotype, 91588a.  
 Odenville formation, on the northwest side of the railroad embankment about ¼ mile northeast of Odenville Station, St. Clair County, Ala.

## PLATE 173

GLYPTAMBONITES, LIMBIMURINA, MACROCOELIA, PAUCICOSTELLA,  
 PTYCHOGLYPTUS, STROPHOMENA

- A. *Ptychoglyptus virginiensis* Willard..... 818  
 (1-4) Respectively posterior, anterior, pedicle, and brachial views of a complete specimen,  $\times 4$ , hypotype, 117398d; (5) brachial view of another complete specimen,  $\times 4$ , paratype, 117398e; (6) brachial interior showing septal ridges and delicate cardinalia,  $\times 5$ , paratype, 117398f; (7) cardinalia of the preceding specimen enlarged  $\times 6$ , showing cardinal process and brachiophores.  
 Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.

- |   | Page |
|---|------|
| B. <i>Ptychoglyptus virginiensis</i> Willard.....   | 818  |
| (8) Brachial view of a young specimen showing the concentrated wrinkles and the anterior nonwrinkled region, $\times 2$ , hypotype, 117398a; (9) exterior of the pedicle valve showing the same features as the preceding specimen, $\times 2$ , hypotype, 117398b; (10) brachial interior showing cardinalia and septal ridges, $\times 3$ , hypotype, 117398c; (11) posterior edge of the preceding brachial valve, $\times 5$ , showing cardinalia; (12) enlargement of the posterior end of the preceding specimen, $\times 10$ , showing the cardinalia.   |      |
| Horizon and locality same as preceding.   |      |
| C. <i>Glyptambonites glyptus</i> Cooper, new species.....   | 713  |
| (13) Exterior of a small pedicle valve, $\times 2$ , paratype, 117387a; (14, 15) interior and exterior of a large pedicle valve, $\times 3$ , showing muscle scars, paratype, 117387b; (16) exterior of a pedicle valve showing details of the ornamentation, $\times 4$ , paratype, 117387c; (17, 21) exterior and posterior of another pedicle valve showing the variable ornamentation and pseudodeltidium, $\times 3$ , paratype, 117387d; (18, 19) interior and posterior of a pedicle valve showing muscle scars and pseudodeltidium, $\times 5$ , paratype, 117387e; (20) a young pedicle valve in exterior view, $\times 4$ , paratype, 117387f; (22) posterior part of a brachial valve showing septal ridges and cardinalia, $\times 4$ , paratype, 117387g; (23) posterior of the preceding specimen enlarged $\times 8$ , showing cardinal process. |      |
| Horizon and locality same as preceding.   |      |
| D. <i>Paucicostella canadensis</i> Cooper, new species.....   | 712  |
| (24) Pedicle exterior, $\times 3$ , paratype, 117394b.  |      |
| Table Head series (upper), Table Point Cove, Newfoundland.  |      |
| E. <i>Strophomena crinerensis</i> Cooper, new species.....  | 934  |
| (25-29) Respectively posterior, anterior, side, pedicle, and brachial views of a nearly perfect specimen, $\times 1$ , holotype, 117718; (30) exterior of the pedicle valve $\times 2$ , showing details of the ornamentation.  |      |
| Bromide formation (Pooleville member), cobbly, light-colored limestone directly above the green shale band, Spring Creek, N $\frac{1}{2}$ sec. 17, T. 2 S., R. 1 W., Murray County, Okla.   |      |
| F. <i>Macrocoelia duplistriata</i> (Willard).....   | 893  |
| (31) Exterior of a somewhat exfoliated pedicle valve, $\times 1$ , hypotype, 117768.  |      |
| Lincolnshire formation (Hogskin member), 0.4 mile northeast of Red Hill, 4 $\frac{1}{2}$ miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.   |      |
| G. <i>Limbimurina brevilimbata</i> Cooper, new species.....   | 852  |
| (32, 33) Pedicle and side views of a large specimen, $\times 1$ , paratype, 117661a; (34) pedicle view of the same specimen, $\times 2$ , showing the frill and wrinkled ornamentation.   |      |
| Botetourt formation (0 to 10 feet of limestone beneath the Botetourt granular bed), in the field on the south side of the road, 0.2 mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.  |      |

## PLATE 174

## PTYCHOLYPTUS

- |  |     |
|--|-----|
| A. <i>Ptychoglyptus virginiensis</i> Willard.....  | 818 |
| (1, 2) Interiors of two brachial valves showing cardinalia and varying degrees of thickening of adductor area, $\times 3$ , hypotypes, 123285b, 123285e. |     |
| Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.   |     |

	Page
B. <i>Ptychoglyptus virginiensis</i> Willard.....	818
(3, 4) Respectively $\times 1$ and $\times 2$ enlargements of an imperfect specimen, hypotype, 111052. Edinburg formation ( <i>Cyrtototella</i> zone), south side tracks, $\frac{1}{8}$ mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.	
C. <i>Ptychoglyptus ? matura</i> Cooper, new species.....	817
(5, 6) Respectively $\times 1$ and $\times 2$ enlargements of the holotype, 111061. Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
D. <i>Ptychoglyptus pulchrus</i> Butts = <i>P. virginiensis</i> Willard.....	818
(7) Pedicle view, $\times 3$ , of the holotype, 71475. Horizon and locality same as preceding.	
E. <i>Ptychoglyptus virginiensis</i> Willard.....	818
(8, 9) Exterior and interior of a nearly perfect specimen, $\times 3$ , hypotype, 98231b; (10) brachial interior of an imperfect specimen, $\times 4$ , hypotype, 98231a; (11, 16) another pedicle exterior and interior showing the ornamentation and dental plates, $\times 3$ , hypotype, 98231b1; (12) another fragmentary brachial interior, $\times 4$ , showing the cardinalia, hypotype, 98231a1. Edinburg formation (Liberty Hall facies, base), 1.8 miles S. 4° W. of Bethel Church, 5.9 miles due east of Harrisonburg, Harrisonburg (15') Quadrangle, Va. (13, 14, 17) Interior of three imperfect brachial valves, $\times 3$ , showing the <i>Sowerbyella</i> -like cardinalia, hypotypes, 111042b, 111042a, and 111042c; (15) brachial view of a large specimen, $\times 2$ , hypotype, 111056. Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.	

## PLATE 175

## GLYPTAMBONITES

A. <i>Glyptambonites glyptus</i> Cooper, new species.....	713
(1) Brachial interior, $\times 3$ , showing median septum, and brachiophores, paratype, 117386c; (2) another fragmentary brachial interior, $\times 3$ , showing median septum and slender brachiophores, paratype, 117386d; (3) plasticine replica of the pedicle exterior, $\times 1$ , paratype, 123250b; (8) same view as preceding, $\times 2$ ; (4) posterior of the pedicle interior showing the muscle scars and pseudo-deltidium, $\times 3$ , paratype, 117386a; (5) exterior of an imperfect pedicle valve, $\times 3$ , showing details of the ornamentation, paratype, 117386b; (7) pedicle valve, $\times 1$ , holotype, 117383a. Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va. (6) Exterior of an imperfect specimen seen in brachial view, $\times 2$ , paratype, 117385b. Effna formation, McNutt Quarry, 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.	
B. <i>Glyptambonites musculosus</i> Cooper, new species.....	715
(9, 10) Respectively $\times 1$ and $\times 2$ views of a pedicle valve, showing the ornamentation, paratype, 117391. Oranda formation, along U. S. Highway 11, 1 $\frac{1}{2}$ to 2 miles southwest of Strasburg, Strasburg (15') Quadrangle, Va.	
C. <i>Glyptambonites musculosus</i> Cooper, new species.....	715
(11) Plasticine replica of the pedicle exterior, $\times 1$ , holotype, 117390c; (12, 13) respectively $\times 1$ and $\times 2$ enlargements of an impression of the pedicle interior	

showing the muscle scars, pallial impressions, and slots produced by dental plates, holotype, 117390c, counterpart of preceding.

Oranda formation, 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.

PLATE 176

GLYPTAMBONITES, PALAEOSTROPHOMENA

- A. *Glyptambonites musculosus* Cooper, new species..... 715
  - (1) Impression of the pedicle interior,  $\times 1$ , the mold from which the plasticine replica on pl. 171, B, fig. 15, was prepared, paratype, 117390a; (2) posterior of the preceding,  $\times 2$ , showing the impression of the muscle area with its long diductor scars; (3) posterior of an incomplete specimen,  $\times 2$ , showing interareas of both valves, chilidium, simple cardinal process, and pseudodeltidium, paratype, 117388d; (4) impression of part of the posterior of the brachial valve showing genital markings and muscle scars,  $\times 2$ , paratype, 117388c; (5) plasticine replica of the cardinalia of the brachial valve,  $\times 2$ , prepared from the preceding mold, showing septa, cardinal process, and brachiophores.
  - Oranda formation, 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.
- B. *Palaeostrophomena ? rugosa* Cooper, new species..... 705
  - (6, 7) Respectively  $\times 1$  and  $\times 2$  enlargements of a brachial valve, paratype, 117379a; (8) exterior of pedicle valve,  $\times 2$ , holotype, 117379c; (9) brachial view,  $\times 2$ , paratype, 117379e; (10) fragment of pedicle valve showing muscle area,  $\times 2$ , paratype, 117379f; (11) impression of the brachial interior,  $\times 3$ , paratype, 117379g; (12) plasticine replica of the brachial interior,  $\times 3$ , prepared from the preceding.
  - Botetourt formation, south side of U. S. Highway 60, 1 mile northwest of Lexington, Lexington (15') Quadrangle, Va.

PLATE 177

TITANAMBONITES

- A. *Titanambonites amplus* (Raymond)..... 718
  - (1-5) Respectively posterior, side, anterior, exterior, and interior views of the pedicle valve,  $\times 1$ , hypotype, 117422; (6, 7) two views of the pedicle interior, one tilted to show the anterior ends of the pallial trunk distributaries, the other tilted to show the delthyrial cavity and the muscle area,  $\times 1\frac{1}{2}$ , same hypotype; (8) interior of the same hypotype,  $\times 2$ , showing the pallial marks.
  - Arline formation (near top), south side of wagon road in glade,  $\frac{1}{4}$  mile south-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
  - (9, 10) Respectively  $\times 1$  and  $\times 2$  enlargements of a brachial interior showing the pallial trunks and adductor field, hypotype, 117418.
  - Arline formation,  $\frac{1}{4}$  mile south of McMullens, Meadow (T.V.A. 139-NW) Quadrangle, Tenn.
- B. *Titanambonites* sp. 1..... 723
  - (11) Exterior of a large brachial valve,  $\times 1$ , figured specimen, 117432.
  - "Lenoir" formation = Little Oak (20 feet under the Pratt Ferry formation), 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.

PLATE 178

TITANAMBONITES

- A. *Titanambonites convexus* Cooper, new species..... 719
  - (1-4) Respectively posterior, pedicle, brachial, and side views of a nearly complete



specimen,  $\times 1$ , holotype, 117424e; (5) enlargement of the pseudodeltidium, chlidium plates, and cardinal process,  $\times 2$ , of the preceding; (6) pedicle view of another specimen,  $\times 1$ , paratype, 117424d; (7, 8) respectively  $\times 1$  and  $\times 2$  enlargements of the interior showing pallial marks and muscle region, paratype, 117424b.

Little Oak formation, intersection of Bailey Gap and main road, SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 13, T. 19 S., R. 2 W., 1 $\frac{3}{4}$  miles northeast of Newhope Church, Cahaba Valley, Vandiver (15') Quadrangle, Ala.

B. *Titanambonites medius* Cooper, new species..... 721

(9) Brachial view of a complete specimen,  $\times 1$ , paratype, 117429b; (10) enlargement of the exterior surface,  $\times 2$ , of the preceding specimen; (11) brachial view of another full-grown specimen,  $\times 1$ , paratype, 117429c; (14, 15) respectively  $\times 1$  and  $\times 2$  enlargements of an impression of the pedicle interior prepared by dissolving the shell away from the matrix to show the pallial and muscle marks, paratype, 117429f; (16, 17) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial internal impression prepared by dissolving the shell from the matrix to show the pallial marks and muscle scars, paratype, 117429g; (18) plasticine replica of the brachial interior,  $\times 2$ , prepared from the preceding impression, showing the septa, pallial marks, and cardinalia; (21) posterior view of cardinalia,  $\times 2$ , paratype, 117429d.

Athens formation (base), east side of the road 1.9 miles northeast of Christiansburg, Sweetwater (T.V.A. 131-SW) Quadrangle, Tenn.

(12, 13) Brachial and side views of a nearly perfect specimen,  $\times 1$ , holotype, 117426b; (19, 20) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial interior showing septa, pallial marks, and cardinalia, paratype, 117426a.

Athens formation (base), Craighead Creek,  $\frac{1}{4}$  mile north of Christiansburg, Sweetwater (T.V.A. 131-SW) Quadrangle, Tenn.

PLATE 179

SOWERBYITES, TITANAMBONITES

A. *Titanambonites amplus* (Raymond)..... 718

(1-5) Respectively anterior, brachial, side, pedicle, and posterior views of a complete specimen,  $\times 1$ , hypotype, 117421; (6) brachial view of part of the preceding specimen,  $\times 2$ , showing beak region of both valves and ornamentation.

"Lenoir" formation = Little Oak ?, east of Leeds, Leeds (15') Quadrangle, Ala.

B. *Sowerbyites delicatus* Cooper, new species..... 725

(7-11) Respectively brachial, posterior, pedicle, anterior, and side views,  $\times 2$ , of the holotype, 117399e; (12) brachial view,  $\times 1$ , of the holotype; (13) brachial view of another complete specimen,  $\times 2$ , paratype, 117399d; (14) pedicle interior,  $\times 2$ , showing callosities at anterior end of diductor scars, paratype, 117399c; (15) another pedicle interior,  $\times 3$ , showing muscle area, anterior callosities, and adductor pit, paratype, 117399g; (16) pedicle interior showing teeth, pseudodeltidium, and muscle area,  $\times 3$ , paratype, 117399a; (17) brachial interior showing median ridge,  $\times 3$ , paratype, 117399h; (18) another brachial interior,  $\times 4$ , showing cardinalia, septa, and pallial markings exceptionally well developed, paratype, 117399f; (19, 20) another brachial interior and posterior view of same showing cardinalia and pallial marks,  $\times 4$ , paratype, 117399b.

Sevier formation, 1.8 miles S. 18° E. of Athens, Athens (T.V.A. 125-NE) Quadrangle, Tenn.

## PLATE 180

## SOWERBYITES, TITANAMBONITES

- |  | Page |
|--|------|
| A. <i>Sowerbyites triseptatus</i> (Willard).....   | 730  |
| (1-3, 5) Respectively posterior, pedicle, anterior, and side views, $\times 1$ , of the hypotype, 117409a; (4, 8) respectively $\times 1$ and $\times 2$ views of another complete specimen, hypotype, 117409b; (9) enlargement, $\times 3$ , of the exterior surface of the preceding; (6) pedicle view of the same hypotype, $\times 2$ , showing thin, crowded lamellae; (7) brachial view of another complete specimen, $\times 2$ , stripped of the lamellae, hypotype, 117409c; (11) brachial interior, showing cardinalia and septum, $\times 2$ , hypotype, 117409e.   |      |
| Lincolnshire formation (Hogskin member), Sally Cleveland Farm, $\frac{3}{4}$ mile southwest of Washburn, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.  |      |
| (10) Pedicle interior showing the muscle area with the thick callosities at the anterior end of the diductor scars, $\times 2$ , hypotype, 117411b.  |      |
| Lincolnshire formation (Hogskin member), Clinchport, Clinchport (T.V.A. 188-NW) Quadrangle, Va.  |      |
| (12) Specimen from which part of the pedicle valve has been removed to show the brachial ridges, $\times 2$ , hypotype, 117410a.   |      |
| Lincolnshire formation (Hogskin member), 0.4 mile east-northeast of Red Hill, $4\frac{1}{2}$ miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.  |      |
| (13) Another brachial interior showing the strong median ridge and the faint lateral ones, $\times 2$ , hypotype, 117412b.   |      |
| Lincolnshire formation (Hogskin member), on the south side of the first bridge on U. S. Highway 25E north of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.  |      |
| B. <i>Titanambonites amplus</i> (Raymond).....   | 718  |
| (14, 15) Brachial and pedicle views of an imperfect specimen, $\times 1$ , hypotype, 117420a; (16) pedicle view of the preceding, $\times 1\frac{1}{2}$ , showing the median ridge exposed through a hole in the pedicle valve.  |      |
| Little Oak formation, point of ridge, 1 mile southwest of Newhope Church, Vandiver (15') Quadrangle, Ala.  |      |
| C. <i>Sowerbyites lamellosus</i> Cooper, new species.....  | 728  |
| (17, 18) Pedicle and brachial views, $\times 1$ , of the holotype, 117406c; (19) brachial view of the holotype, $\times 2$ , showing the external lamellae; (20, 21) respectively $\times 1$ and $\times 2$ enlargements of the pedicle interior, showing adductor pit, long diductor scars, and pallial marks, paratype, 117402c; (23) another pedicle interior showing the callosities at the anterior ends of the diductor scars, $\times 2$ , paratype, 117402b; (22) another pedicle interior, $\times 2$ , showing the muscle scars well, paratype, 117402h; (24, 25) respectively $\times 1$ and $\times 2$ of the brachial interior showing the median septum and cardinalia, paratype, 117402a. |      |
| Bromide formation (Mountain Lake member—160 feet above the base), $\frac{1}{4}$ mile west of U. S. Highway 77, NE $\frac{1}{4}$ sec. 25, T. 2 S., R. 1 E., Carter County, Okla.  |      |

## PLATE 181

## SOWERBYITES, TITANAMBONITES

- |   |     |
|---|-----|
| A. <i>Titanambonites crassus</i> (Willard).....   | 720 |
| (1, 2, 6) Pedicle, brachial, and side views of a complete specimen, $\times 1$ , hypotype, 117425a; (3-5) brachial, side, and pedicle views of a large specimen, $\times 1$ , hypotype, 117425b; (8) impression of the pedicle interior, $\times 1$ , prepared by burning shell from matrix, hypotype, 117425c; (7, 9) respectively $\times 1$ and $\times 1\frac{1}{2}$ enlarge- |     |

- ments of a plasticine replica of the brachial interior, prepared from hypotype, 117425e.
- Effna formation, McNutt Quarry, 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.
- B. *Sowerbyites lamellosus* Cooper, new species..... 728  
 (10, 11) Respectively  $\times 1$  and  $\times 2$  enlargements of a complete specimen, paratype, 117405a; (12, 13, 15) posterior, anterior, and side views,  $\times 1$ , of the paratype; (14) brachial view of another complete specimen, showing lamellae,  $\times 1$ , paratype, 117405c; (17) pedicle view,  $\times 1$ , of a paratype, 117405d; (16) brachial view,  $\times 1$ , of another complete specimen, paratype, 117405b; (18) interareas of the preceding specimen,  $\times 3$ , showing pseudodeltidium.
- Yellow limestone above 25-foot bed of Eureka group, saddle just north of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.
- C. *Sowerbyites hami* Cooper, new species..... 727  
 (19, 25, 26) Brachial, side, and anterior views,  $\times 1$ , of the holotype, 117400a; (20, 22-24, 33) respectively brachial, side, anterior, posterior, and pedicle views,  $\times 2$ , of the holotype; (27) posterior of holotype,  $\times 3$ , showing deltidial and chlidial structures; (21) brachial view of a paratype,  $\times 2$ , 117400f; (28) pedicle interior,  $\times 3$ , showing elongate muscle scars, paratype, 117400b; (29) brachial interior,  $\times 1$ , paratype, 117400d; (31, 32) posterior and interior views of the preceding,  $\times 3$ , showing septa, pallial marks, and cardinalia; (30) another brachial interior,  $\times 3$ , showing the 3 septa characteristic of the genus, paratype, 117400e.
- Bromide formation (Pooleville member), road cut on east side section-line road, 1,300 feet south of the northwest corner sec. 23, T. 1 S., R. 3 E., Murray County, Okla.

## PLATE 182

## SOWERBYITES

- A. *Sowerbyites subnasutus* Cooper, new species..... 729  
 (1) Interior of an imperfect pedicle valve showing the long diductor scars and the callosities at their anterior ends,  $\times 2$ , paratype, 111797a; (2, 5) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial view of a complete specimen showing traces of the lamellae, paratype, 98187a; (8) pedicle view,  $\times 1$ , of the preceding specimen; (3, 6) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial view of a complete specimen, showing lamellae, paratype, 111797d; (9) pedicle view,  $\times 1$ , of the preceding; (7) brachial view of another complete specimen,  $\times 1$ , holotype, 111797g; (10) brachial exterior showing strong development of lamellae,  $\times 2$ , paratype, 98187b; (4) pedicle view of a specimen from which part of the pedicle valve has been removed to show the septa of the brachial valve,  $\times 3$ , paratype, 98187c; (11) interior of the brachial valve,  $\times 2$ , showing the septa and cardinalia, paratype, 111797f.
- Lincolnshire formation, Marcem Quarry, 2 miles west of Gate City on the north side of U. S. Highway 58, Gate City (T.V.A. 188-NE) Quadrangle, Va.
- B. *Sowerbyites triseptatus* (Willard)..... 730  
 (12) Exterior from the brachial side and showing closely crowded lamellae,  $\times 2$ , hypotype, 111796e; (23) brachial interior showing septa, cardinalia, and cardinal process,  $\times 3$ , hypotype, 111796b; (22) side view of a brachial valve showing swelling at the anterior end of the median septum,  $\times 1$ , hypotype, 111796c; (17, 24, 28, 29) pedicle, brachial, posterior, and anterior views of a complete

specimen,  $\times 1$ , hypotype, 111796a; (27) side view of another complete specimen,  $\times 1$ , hypotype, 111796f.

Lincolnshire formation, Clinch Valley at Shiloh Church, near center of northwest subquad. of Pressmens Home (T.V.A. 171-NE) Quadrangle, Tenn.

- (13) Pedicle interior,  $\times 2$ , showing pallial marks, adductor pit, and diductor callosities, hypotype, 117415j; (15) another pedicle interior showing callosities and pallial marks connected with them,  $\times 2$ , hypotype, 117415i; (14) muscle region of the preceding enlarged  $\times 3$  to show callosities in detail; (16, 18) brachial and pedicle views of a nearly perfect specimen,  $\times 2$ , hypotype, 117415b; (19) brachial interior of a young specimen,  $\times 3$ , hypotype, 117415e; (20) brachial view of a wide specimen,  $\times 1$ , hypotype, 117415g; (21) brachial interior,  $\times 1$ , showing unusual development of septa, hypotype, 117415a; (26) posterior view of preceding,  $\times 3$ , showing cardinal process; (25) brachial interior,  $\times 3$ , showing septa, brachiophores, and cardinal process.

Lincolnshire formation (90 to 120 feet above the "Mosheim"), along U. S. Highway 25E, 1 mile north of Indian Creek, Evans Ferry section, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.

### PLATE 183

#### SOWERBYITES

- A. *Sowerbyites gildersleevei* Cooper, new species..... 725

(1, 2) Brachial and pedicle views,  $\times 1$ , of the holotype, 117401z; (3) brachial view,  $\times 2$ , of the holotype; (4) exterior of a pedicle valve,  $\times 1$ , paratype, 117401p; (5, 6) respectively  $\times 1$  and  $\times 2$  views of the brachial exterior, paratype, 117401d; (7) muscle area of the pedicle interior,  $\times 2$ , paratype, 117401v; (8) pedicle interior,  $\times 2$ , showing callosities anterior to diductor scars and pallial marks anterior to the callosities, paratype, 117401h; (9) another pedicle interior showing pallial marks,  $\times 2$ , 117401e; (10) same as preceding,  $\times 1$ ; (11) brachial interior,  $\times 3$ , showing median septa and genital markings, paratype, 117401q; (13) another brachial interior,  $\times 2$ , showing genital markings, paratype, 117401k; (12) posterior of a brachial valve,  $\times 3$ , showing cardinalia, paratype, 117401b; (14) posterior of another brachial interior showing septa and cardinalia,  $\times 2$ , paratype, 117401m; (15) posterior view of the preceding,  $\times 3$ , showing cardinal process and chilidial plates; (16) brachial interior showing pallial marks,  $\times 1$ , paratype, 117401n.

Lincolnshire formation (8 feet below the *Cybeloides* bed), north side of road along Tumbling Run,  $1\frac{1}{2}$  miles southwest of Strasburg, Strasburg (15') Quadrangle, Va.

- B. *Sowerbyites triseptatus* (Willard)..... 730

(17) Brachial view of a complete specimen,  $\times 2$ , hypotype, 123252b; (18) exterior of a pedicle valve showing wrinkles along the posterior margin,  $\times 1$ , hypotype, 123252a.

Lincolnshire formation, 0.2 mile southwest of Shiloh Church, near center of northwest subquad., Pressmens Home (T.V.A. 171-NE) Quadrangle, Tenn.

### PLATE 184

#### BIMURIA, EOPLECTODONTA, ISOPHRAGMA, PALAEOSTROPHOMENA, SOWERBYITES, TITANAMBONITES

- A. *Eoplectodonta alternata* (Butts)..... 808

(1, 2) Brachial and side views,  $\times 2$ , of a hypotype, 117549a; (3) brachial view,  $\times 1$ , of the hypotype. For additional views see pl. 207, B, figs. 2-25.

	Page
Dark shale under Eureka quartzite, 4.2 miles north-northeast of Martin Ranch, Roberts Mountains (1°) Quadrangle, Nev.	
B. <i>Bimuria parvula</i> Cooper, new species.....	769
(4) Exterior of a small pedicle valve, $\times 2$ , paratype, 123253a. Edinburg formation ( <i>Cyrtototella</i> zone), south side of road 0.2 mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.	
C. <i>Bimuria superba</i> Ulrich and Cooper.....	771
(5) Pedicle exterior, $\times 1$ , hypotype, 11472a. Botetourt formation, north side of Virginia Highway 114, 2.3 miles west of the Montgomery-Roanoke County line, 12 miles northeast of Blacksburg, Va.	
D. <i>Titanambonites praecursor</i> Cooper, new species.....	722
(6-9) Respectively posterior, anterior, pedicle, and brachial views of a damaged but complete specimen, $\times 1$ , holotype, 117431a; (10, 11) respectively $\times 1$ and $\times 1\frac{1}{2}$ views of brachial valve showing cardinalia and pallial marks, paratype, 117431b; (12) incomplete pedicle interior, $\times 1$ , showing long diductor scars, paratype, 117431c. Lenoir formation (lower part of the <i>Billingsaria</i> zone), south side of road in section 1 mile northeast of Friendsville, east edge of Concord (T.V.A. 138-SW) and adjacent Louisville (T.V.A. 138-SE) Quadrangles, Tenn.	
E. <i>Palaeostrophomena superba</i> Cooper, new species.....	706
(13) Brachial view of a complete specimen, $\times 1$ , paratype, 117381a; (14-16) posterior, anterior, and side views, $\times 2$ , of the preceding specimen; (17) pedicle exterior, $\times 2$ , showing the ornamentation, paratype, 117381c; (18) pedicle interior, $\times 2$ , showing muscle and pallial marks, paratype, 117381b. Arline formation (lower), 100 yards southwest of the Negro Cemetery, $\frac{1}{2}$ mile northeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
F. <i>Isophragma extensum</i> Cooper, new species.....	735
(19-22) Respectively posterior, anterior, side, and pedicle views of a complete specimen, $\times 2$ , paratype, 117375. For brachial view see pl. 170, C, fig. 17. Little Oak formation, junction of Bailey Gap road and main Cahaba Valley road, $1\frac{3}{4}$ miles northeast of Newhope Church, SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 19 S., R. 2 W., Vandiver (15') Quadrangle, Ala.	
G. <i>Sowerbyites lamellosus</i> Cooper, new species.....	728
(23, 24) Pedicle and brachial views of a complete specimen, $\times 1$ , paratype, 117403a; (25) brachial view of the preceding specimen, $\times 2$ , showing lamellae interarea; (26) brachial interior, $\times 2$ , showing septa, cardinalia, and pallial marks, paratype, 117403b; (27) imperfect pedicle interior showing muscle area, $\times 2$ , paratype, 117403c. Bromide formation (Mountain Lake member—massive "reef" limestone), west side of the road cut on Oklahoma Highway 18, 1.8 miles south of Sulphur, Murray County, Okla.	

## PLATE 185

## HESPEROMENA, SYNDIELASMA, TITANAMBONITES

A. <i>Hesperomena leptellinoidea</i> Cooper, new species.....	745
(1) Pedicle exterior, $\times 1$ , holotype, 117560; (2) same view, $\times 2$ , of holotype; (3) posterior view of the pedicle valve of the holotype, $\times 3$ , showing apical foramen and pseudodeltidium; (4) pedicle interior, $\times 1$ , holotype; (5) same view as preceding, $\times 2$ , showing vague outline of muscle area and pseudopunctate interior surface; (6) side view, $\times 1$ , of holotype; (7) brachial view, $\times 2$ , of holotype; (8) brachial interior, $\times 1$ , of holotype; (9) same view as preceding, $\times 2$ , showing median ridge, subperipheral thickening, and cardinalia; (10) pos-	

- terior of brachial valve of holotype,  $\times 3$ , showing cardinal process and ends of brachiophores.
- Upper Pogonip group (upper 30 feet), 1 mile above mouth of Ikes Canyon, Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.
- B. *Titanambonites medius* Cooper, new species..... 721  
 (11, 12) Anterior and exterior views of a large pedicle valve,  $\times 1$ , paratype, 117429a; (13) interior of a slightly laterally compressed pedicle valve showing elongate diductors and their anterior thickenings,  $\times 1$ , paratype, 117429e.  
 Athens formation (base), 1.9 miles northeast of Christiansburg, Sweetwater (T.V.A. 131-SW) Quadrangle, Tenn.
- C. *Syndielasma biseptatum* Cooper, new species..... 743  
 (14-18) Respectively brachial, pedicle, anterior, posterior, and side views,  $\times 2$ , of the holotype, 117565g; (19, 20) pedicle and brachial views,  $\times 2$ , of a paratype, 117565a; (21, 22) pedicle and brachial views of another paratype,  $\times 2$ , showing deep brachial sulcus, 117565e; (23) pedicle view of a well-preserved specimen showing costellae,  $\times 2$ , paratype, 117565c; (24) brachial view,  $\times 1$ , of the preceding; (25) brachial interior,  $\times 3$ , showing notothyrial callosity and long, slender diverging plates extending anteriorly from it, paratype, 117565i; (26) the brachial plates seen through a "window" in the pedicle valve,  $\times 3$ , paratype, 117565b; (27) brachial interior of a very young specimen,  $\times 5$ , paratype, 117565d; (28, 29) interior and posterior views of the brachial valve,  $\times 5$ , showing notothyrial callosity, long, slender brachiophores, and cardinal process, paratype, 117565h.  
 Horizon and locality same as A above.

## PLATE 186

ANCISTORHYNCHA, DACTYLOGONIA, EREMOTOECHIA, LEPTELLINA, PTYCHOGLYPTUS,  
REUSHELLA, ZYGOSPIRA

- A. *Leptellina bella* Cooper, new species..... 748  
 (1, 6) Pedicle view,  $\times 1$ , of a paratype, 117435b; (4) side and exterior views,  $\times 2$ , of the preceding; (2, 3, 5) posterior, pedicle, and anterior views,  $\times 2$ , of another paratype, 117435c; (7) pedicle view,  $\times 3$ , of the same; (8) impression of the pedicle interior showing the muscle area,  $\times 2$ , paratype, 117435f.  
 Whitesburg formation, old road to Morristown, 1½ miles west of Bulls Gap, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.
- B. *Zygospira* sp. 1..... 674  
 (9) Exterior of the pedicle valve,  $\times 2$ , figured specimen, 117262a; (10) exterior of the brachial valve showing broad sulcus,  $\times 2$ , figured specimen, 117262b.  
 Sevier formation, slope on west side of the church in Guthrie Gap, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.
- C. *Reuschella vespertina* Cooper, new species..... 979  
 (11) Exterior of a poorly preserved brachial valve showing deep sulcus,  $\times 1$ , paratype, 123255b; (12) exterior of the pedicle valve showing median carina,  $\times 1$ , paratype, 123255c.  
 Dark shale under Eureka quartzite, in north-facing nose of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.
- D. *Leptellina platys* Cooper, new species..... 751  
 (13, 14) Pedicle and brachial exteriors of a nearly complete specimen,  $\times 2$ , holotype, 117439.  
 Benbolt formation (base), ¼ mile east of Speers Ferry, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

- |   | Page |
|---|------|
| E. <i>Dactylogonia strasburgensis</i> Cooper, new species.....  | 835  |
| (15) Exterior of a pedicle valve, $\times 1$ , holotype, 117600c; (16) same view as preceding, $\times 2$ , to show details of ornamentation; (17, 18) side and pedicle views of another specimen, $\times 1$ , paratype, 117600a; (19) a somewhat deformed pedicle valve, $\times 1$ , paratype, 117599a.  |      |
| Edinburg formation ( <i>Cyrtonotella</i> bed), ravine opposite switch $\frac{1}{2}$ mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.  |      |
| F. <i>Eremotoecchia silicica</i> Cooper, new species.....   | 515  |
| (20) Interior of the pedicle valve showing the long dental plates, small teeth, and crural fossettes, $\times 2$ , paratype, 117065g; (21) interarea of another pedicle valve showing pseudodeltidium, foramen, and teeth, $\times 3$ , paratype, 117065h; (22) exterior of an immature pedicle valve showing large foramen and somewhat tubular beak, $\times 2$ , paratype, 117065n; (23) posterior view of the brachial valve showing lobate cardinal process and short brachiophores (note also smooth umbonal region), $\times 3$ , paratype, 117065-l; (24, 25) side and exterior views of the pedicle valve, $\times 1$ , paratype, 117065j. |      |
| Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.  |      |
| G. <i>Ancistrorhyncha crassa</i> Cooper, new species.....   | 623  |
| (26) Brachial view of a complete specimen, $\times 1$ , paratype, 117208a; (27-31) respectively side, anterior, brachial, pedicle, and posterior views, $\times 2$ , of the preceding specimen.   |      |
| Ridley formation, on Tennessee Highway 28, 0.6 mile south of Chappel Hill Methodist Church, 1 mile south of junction with Tennessee Highway 8, Daus (T.V.A. 104-SW) Quadrangle, Tenn.   |      |
| H. <i>Ptychoglyptus virginiensis</i> Willard.....   | 818  |
| (32) Exterior of a plaster replica, $\times 2$ , of the holotype, original M.C.Z. 8626; (33) plaster replica of the exterior of the brachial valve, $\times 2$ , original paratype, M.C.Z. 8627.  |      |
| Effna formation, McNutt Quarry, 12 miles southwest of Bland, Burkes Garden (15') Quadrangle, Va.  |      |
| I. <i>Ptychoglyptus virginiensis</i> Willard.....   | 818  |
| (34) Exterior of a brachial valve, $\times 2$ , hypotype, 117397.   |      |
| Effna formation (massive limestone calcarenite), in base of black shale or top of Arline formation, on the south side of Tennessee Highway 66A, $\frac{1}{2}$ mile northeast of St. Clair, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.  |      |

## PLATE 187

## LEPTELLINA

- |  |     |
|--|-----|
| A. <i>Leptellina primaria</i> Cooper, new species.....   | 752 |
| (1-4) Respectively brachial, posterior, anterior, and side views, $\times 1$ , of the holotype, 117441d; (5) brachial view, $\times 2$ , of the holotype; (6) small slab showing a pedicle exterior and a brachial interior, $\times 2$ , paratypes, 117441b, 117441c; (7) brachial interior, $\times 2$ , showing elevated visceral disk and brachial processes, paratype, 117441a. |     |
| Crown Point formation (A18-A23 of Raymond), south end of Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.  |     |
| B. <i>Leptellina</i> sp. 1.....  | 759 |
| (8) Brachial interior of a large species, the largest yet found, $\times 1$ , figured specimen, 117458.  |     |
| Edinburg formation ( <i>Cyrtonotella</i> zone), about $\frac{1}{2}$ mile west of Strasburg, Strasburg (15') Quadrangle, Va.  |     |

- C. *Leptellina tennesseensis* Ulrich and Cooper ..... 756  
 (9, 10) Brachial and pedicle views,  $\times 2$ , of the holotype, 92871; (11) brachial interior of the holotype,  $\times 2$ , showing disk and cardinalia; (12) interior of the pedicle valve,  $\times 2$ , showing the small muscle area and the pallial trunks, hypotype, 117452; (13) anterior view of interior of brachial valve of holotype,  $\times 3$ , showing pallial trunks.  
 Arline formation (middle to top), both sides of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- D. *Leptellina tennesseensis* Ulrich and Cooper ..... 756  
 (14-17) Respectively posterior, side, brachial, and anterior views of a complete specimen,  $\times 1$ , hypotype, 108135h; (18) brachial view of another complete specimen,  $\times 2$ , hypotype, 108135d; (19) pedicle view of a large specimen,  $\times 2$ , hypotype, 108135g; (20) pedicle interior showing pallial marks,  $\times 2$ , hypotype, 108135p; (21) pedicle interior,  $\times 2$ , tilted to show delthyrial cavity, hypotype, 108135m; (22) pedicle interior,  $\times 3$ , showing exceptional development of pallial marks, hypotype, 108135s; (23-25) anterior, normal, and posterior views of a well-preserved brachial interior, showing pallial marks and cardinalia,  $\times 3$ , hypotype, 108135-o; (26) anterior of an imperfect brachial interior,  $\times 3$ , showing pallial marks, hypotype, 108135t; (29) brachial interior,  $\times 2$ , of the preceding; (30) posterior of the preceding,  $\times 3$ , showing cardinal process and chilidial plates; (27) posterior of a brachial valve,  $\times 3$ , showing cardinal process and ends of brachiophores, hypotype, 108135u; (28) disk region of another brachial valve,  $\times 3$ , showing cardinalia, hypotype, 108135e.  
 Horizon and locality same as preceding.

## PLATE 188

## LEPTELLINA, LEPTELLOIDEA

- A. *Leptellina tennesseensis* Ulrich and Cooper ..... 756  
 (1-4) Respectively anterior, exterior, side, and posterior views of a pedicle valve,  $\times 3$ , hypotype, 117454a; (11) interior of another pedicle valve,  $\times 3$ , hypotype, 117454b.  
 Arline formation (lower), 100 yards southwest of the Negro Cemetery,  $\frac{1}{2}$  mile northeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.  
 (5-8, 10) Respectively posterior, pedicle, side, anterior, and brachial views of a complete specimen,  $\times 3$ , hypotype, 117453a; (9) brachial view of another specimen smaller than the preceding,  $\times 3$ , hypotype, 117453b.  
 Arline formation, 5 miles southeast of Knoxville, on Knoxville-Sevierville Pike, Tenn.
- B. *Leptellina sublamellosa* Cooper, new species ..... 755  
 (12) Brachial interior showing disk region and cardinalia,  $\times 3$ , paratype, 117451a.  
 Benbolt formation (base), west side of hill  $\frac{1}{2}$  mile east of Cedar Point School, Hilton (T.V.A. 197-NE) Quadrangle, Va.
- C. *Leptellina delicatula* (Butts) ..... 749  
 (13, 14) Pedicle and brachial views of a complete specimen,  $\times 2$ , hypotype, 117436e.  
 Little Oak formation, junction of Bailey Gap and main roads, Cahaba Valley, SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 13, T. 19 S., R. 2 W., 1 $\frac{1}{4}$  miles northeast of Newhope Church, Vandiver (15') Quadrangle, Ala.
- D. *Leptellina sublamellosa* Cooper, new species ..... 755  
 (15-17, 19, 20) Respectively pedicle, posterior, anterior, brachial, and side views of a complete specimen,  $\times 3$ , preserving some of the lamellae, paratype, 117449c;



(18, 21) brachial and pedicle views of another complete specimen,  $\times 3$ , paratype, 117449f; (22) pedicle view of a nearly perfect specimen preserving a large patch of lamellae,  $\times 3$ , paratype, 117449d; (23) impression of the pedicle interior prepared by burning the shell and showing form of the pedicle muscle scars,  $\times 2$ , paratype, 117449g; (24) brachial interior,  $\times 3$ , paratype, 117449a.

Benbolt formation (base), 0.2 mile south of the middle fork of Moccasin Creek,  $1\frac{1}{2}$  miles due south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.

- E. *Leptelloidea leptelloides* (Bekker)..... 763  
 (25) Brachial view of a complete specimen showing ornamentation, delthyrium, cardinal process, and chilidial plates,  $\times 3$ , hypotype, 84257c; (26) normal view of the exterior of a brachial valve showing interarea and cardinal process twisted into a hypercline position,  $\times 3$ , hypotype, 84257b; (29, 30) interior views of the same specimen as preceding,  $\times 3$ , showing disk, septum, shaft of cardinal process, and brachiophores, and tilted to show edge of disk; (27) pedicle interior tilted to show teeth with strong fossettes and thickened muscle area,  $\times 3$ , hypotype, 84257d; (28) another pedicle interior showing the delthyrial cavity, muscle scars, and adductor pit,  $\times 3$ , hypotype, 84257a.  
 Kuckers formation (C<sub>2</sub> a), Kohtla, Estonia.

## PLATE 189

## LEPTELLINA

- A. *Leptellina pulchra* Cooper, new species..... 753  
 (1) Exterior of the pedicle valve showing loosely crowded lamellae,  $\times 1$ , paratype, 117443; (2-4) posterior, anterior, and side views of a complete specimen,  $\times 1$ , holotype, 117444d; (14) brachial view,  $\times 2$ , of the holotype; (5) exterior of a pedicle valve,  $\times 1$ , showing difference in size of costellae, paratype, 117444c; (6, 16) exterior and side view of a full-grown pedicle valve,  $\times 1$ , paratype, 117444a; (7, 17) side and interior views of another pedicle valve,  $\times 1$ , paratype, 117444e; (18) same pedicle interior as preceding,  $\times 2$ , showing form of muscle scar and pallial marks; (8) brachial view of a complete specimen not preserving lamellae but showing costellae clearly,  $\times 1$ , paratype, 117444h; (9, 10) brachial and pedicle views of the preceding specimen,  $\times 2$ , showing major and minor costellae; (11) brachial view of another complete specimen,  $\times 1$ , paratype, 117444f; (12, 13, 15) respectively brachial, posterior, and pedicle views of the preceding specimen,  $\times 2$ , showing interarea, cardinal process, chilidial plates, and pseudodeltidium; (19) brachial interior,  $\times 1$ , showing elevated disk, paratype, 117444b; (20-22) posterior, anterior, and normal views of the preceding brachial valve,  $\times 2$ , showing elevated disk with pallial marks on slope anterior to disk, median septum, cardinal process, chilidial plates, and brachiophores; (23) disk region of another brachial interior showing cardinalia,  $\times 2$ , paratype, 117444g.  
 Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- B. *Leptellina temesseensis* Ulrich and Cooper..... 756  
 (24) Brachial view,  $\times 1$ , hypotype, 117456a; (25-29) respectively brachial, posterior, anterior, side, and pedicle views,  $\times 2$ , of the preceding specimen.  
 Arline formation (10 feet below "Holston" = Red Knobs), 1 mile east-north-east of Friendsville, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.
- C. *Leptellina occidentalis* Ulrich and Cooper..... 751  
 (30) Exterior of the pedicle valve,  $\times 2$ , showing traces of lamellae, hypotype, 108133b; (31) exterior of a brachial valve,  $\times 2$ , hypotype, 108133d; (32) two valves showing pedicle interior with the small muscle areas,  $\times 2$ , hypotype,

108133c; (33) imperfect pedicle interior showing the small muscle area and small pseudodeltidium,  $\times 3$ , hypotype, 117440a; (34) brachial interior,  $\times 2$ , showing small disk, hypotype, 108133c; (35) another brachial interior showing the delicate cardinalia,  $\times 2$ , hypotype, 108133a; (36) brachial interior of a very young specimen,  $\times 4$ , showing cardinalia and an interior with an incipient disk, hypotype, 117440c; (37) excellent brachial interior showing the well-formed disk and cardinalia,  $\times 3$ , hypotype, 117440b.

Pogonip group (topmost beds), Ikes Canyon about 1 mile above the mouth, east side Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.

## PLATE 190

## LEPTELLINA

- A. *Leptellina bella* Cooper, new species..... 748  
 (1, 2) Pedicle and brachial views of a complete specimen,  $\times 1$ , holotype, 117434c; (3) brachial view,  $\times 2$ , of the preceding; (4) brachial interior,  $\times 3$ , showing disk and cardinalia, paratype, 117434b.  
 Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Bland County, Va.
- B. *Leptellina sublamellosa* Cooper, new species..... 755  
 (5) Exterior of the pedicle valve,  $\times 1$ , paratype, 117450a; (6-8) pedicle, side, and anterior views,  $\times 2$ , of the preceding specimen.  
 Edinburg formation (*Cyrtonotella* zone), ravine on south side of railroad tracks,  $\frac{1}{8}$  mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.
- C. *Leptellina sublamellosa* Cooper, new species..... 755  
 (9) Brachial view of a complete specimen preserving some external lamellae,  $\times 1$ , paratype, 117447b; (17, 18) pedicle and brachial views,  $\times 2$ , of the same specimen; (10-12) posterior, anterior, and brachial views of a complete specimen,  $\times 1$ , holotype, 117447g; (13-16) respectively brachial, side, anterior, and posterior views,  $\times 2$ , of the preceding specimen; (19, 20) interior and posterior views of the brachial valve showing cardinalia, disk, and median ridge,  $\times 3$ , paratype, 117447e; (23) same as preceding,  $\times 2$ ; (21, 22) anterior and side views of another brachial interior showing elevated disk and pallial marks on the surface anterior to it,  $\times 3$ , paratype, 117447f; (24) normal interior view,  $\times 2$ , of the preceding; (25) interior of the pedicle valve tilted to show muscle area,  $\times 2$ , paratype, 117447h.  
 Chatham Hill formation, 1.2 miles S. 31° E. of Sharon Springs, Burkes Garden (15') Quadrangle, Va.
- D. *Leptellina tennesseensis* Ulrich and Cooper..... 756  
 (26-29) Respectively brachial, anterior, side, and pedicle views of a nearly complete specimen,  $\times 2$ , showing lamellae, hypotype, 117455a; (30) pedicle view of another, imperfect specimen,  $\times 2$ , not preserving the exterior lamellae, hypotype, 117455b; (31) posterior view of the preceding,  $\times 3$ , showing pseudodeltidium, cardinal process, and chilidial plates.  
 Arline formation, on Sevierville Pike, 3 miles southeast of Knoxville, Tenn.
- E. *Leptellina subcarinata* Cooper, new species..... 754  
 (32) Plasticine replica of the brachial exterior of a complete specimen,  $\times 2$ , prepared from mold, paratype, 117446g; (33) plasticine replica of the pedicle exterior,  $\times 2$ , prepared from mold, holotype, 117446a; (34) impression of the pedicle interior showing small muscle area,  $\times 2$ , paratype, 117446h; (35) another pedicle interior impression showing muscle area and pseudopunctate anterior,  $\times 2$ , paratype, 117446f; (36) plasticine replica of the pedicle interior prepared from the preceding impression,  $\times 2$ , and showing small ridge anterior to muscle area;

(37) another impression of the pedicle interior,  $\times 2$ , counterpart to pedicle exterior, fig. 33, holotype; (38) plasticine replica of the brachial interior,  $\times 2$ , prepared from mold, paratype, 117446b; (39) another plasticine replica of the brachial interior,  $\times 2$ , showing septum and cardinalia, prepared from mold, paratype, 117446c.

Athens formation (base), just east of the road junction,  $2\frac{1}{2}$  miles south-south-east of Riceville, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.

## PLATE 191

## LEPTELLINA

- A. *Leptellina transversa* Cooper, new species..... 758  
 (1, 2) Pedicle and brachial views,  $\times 1$ , outline partially restored, of the holotype, 117457a; (3-7) respectively posterior, anterior, side, pedicle, and brachial views,  $\times 2$ , of the holotype; (8) brachial interior seen from the pedicle side,  $\times 2$ , paratype, 117457c.  
 Arline formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- B. *Leptellina incompta* Cooper, new species..... 750  
 (9) Brachial view of a complete specimen,  $\times 1$ , paratype, 117438b; (10-13) respectively brachial, posterior, side, and pedicle views,  $\times 2$ , of the preceding paratype; (14-17) respectively pedicle, brachial, posterior, and anterior views,  $\times 2$ , showing exterior lamellae, of the holotype, 117438c; (18) pedicle view,  $\times 1$ , of the holotype; (19, 20) brachial and pedicle views,  $\times 2$ , of another paratype, 117438a; (21) pedicle interior,  $\times 3$ , the view being a reconstruction of a valve preserving one-half of the specimen, paratype, 117438d; (22) anterior part of an imperfect brachial valve preserving part of the disk,  $\times 2$ , paratype, 117438e.  
 Dark shale below Eureka quartzite, in north-facing nose of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.
- C. *Leptellina abbreviata* Cooper, new species..... 747  
 (23-25) Side, pedicle, and brachial views,  $\times 1$ , showing patches of lamellae remaining on the shell, holotype, 117433a; (26-30) respectively side, anterior, posterior, pedicle, and brachial views,  $\times 2$ , of the holotype; (31) impression of the pedicle interior showing the form of the muscle scars,  $\times 2$ , paratype, 117433b.  
 Oranda formation, in the railroad cut,  $\frac{1}{2}$  mile west of Strasburg, Strasburg (15') Quadrangle, Va.
- D. *Leptellina delicatula* (Butts)..... 749  
 (32, 33) Brachial and pedicle views of a young specimen,  $\times 1$ , hypotype, 117436a; (34) brachial view of an adult specimen,  $\times 1$ , hypotype, 117436d; (35-39) respectively anterior, side, posterior, pedicle, and brachial views,  $\times 2$ , of the preceding specimen.  
 Little Oak formation, junction Bailey Gap and main roads, Cahaba Valley, SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 13, T. 19 S., R. 2 W.,  $1\frac{3}{4}$  miles northeast of Newhope Church, Vandiver (15') Quadrangle, Ala.

## PLATE 192

## BILOBIA, EOPLECTODONTA

- A. *Bilobia virginiensis* Cooper, new species..... 762  
 (1-5) Respectively brachial, anterior, posterior, side, and pedicle views of a complete specimen,  $\times 3$ , paratype, 117467c.

	Page
Shippensburg formation (Pinesburg member— <i>Echinospaerites</i> zone), on U. S. Highway 40, on the west side of Conococheague Creek, 7 miles west of Hagerstown, Williamsport (15') Quadrangle, Md.	
B. <i>Bilobia virginiensis</i> Cooper, new species.....	762
(6-9) Pedicle, anterior, side, and brachial views, $\times 3$ , holotype, 117464a; (13) brachial interior of an imperfect valve, $\times 3$ , paratype, 117464b; (14) interarea of the preceding, $\times 5$ , showing chilidial plates and cardinal process; (15) another brachial interior, $\times 5$ , showing median ridge and disk, paratype, 117464c.	
Edinburg formation (lower part of <i>Nidulites</i> zone), cut on U. S. Highway 11, 100 yards south of entrance to Battlefield Crystal Caverns, Hupp Hill, 1 mile north of Strasburg, Strasburg (15') Quadrangle, Va.	
(10-12) Interior, anterior, and side views of a nearly perfect brachial valve showing the peculiar disk, $\times 3$ , paratype, 117466a.	
Edinburg formation (middle <i>Nidulites</i> zone), Tumbling Run $1\frac{1}{2}$ miles southwest of Strasburg, Strasburg (15') Quadrangle, Va.	
C. <i>Bilobia hemisphaerica</i> Cooper, new species.....	760
(16-20) Respectively pedicle, side, posterior, anterior, and brachial views, $\times 2$ , of a complete specimen, paratype, 117460b.	
Martinsburg formation (part with <i>Brongniartella</i> and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.	
D. <i>Bilobia musca</i> (Öpik).....	761
(21) Brachial view of a complete specimen, $\times 3$ , hypotype, 84258b; (22) pedicle interior showing thickened muscle area, $\times 3$ , hypotype, 84258a; (23) brachial interior, $\times 3$ , showing bilobed disk, and cardinalia, hypotype, 84258c; (24) posterior view of the preceding $\times 2$ , showing hypercline interarea, cardinal process, and chilidial plates.	
Kuckers formation (C. $\alpha$ ), Kohtla, Estonia.	
E. <i>Eoplectodonta</i> sp. 1.....	813
(25) Plasticine replica of the brachial exterior, $\times 3$ , figured specimen, 117556; (26) impression of the brachial interior, $\times 3$ , counterpart to mold from which preceding figure was prepared; (27) plasticine replica, $\times 3$ , of the brachial interior prepared from the preceding mold; (28) same as preceding, $\times 5$ , showing hinge denticles.	
Edinburg formation (siltstone about 30 feet above <i>Echinospaerites</i> zone), $1\frac{1}{2}$ miles south of Wadesville, Winchester (15') Quadrangle, Va.	

## PLATE 193

## ANISOPLEURELLA, BILOBIA

A. <i>Anisopleurella tricostellata</i> Cooper, new species.....	806
(1) Exterior of a young pedicle valve, $\times 4$ , paratype, 110925d; (2) another pedicle exterior showing lateral wrinkles, $\times 4$ , paratype, 110925c; (3) a third pedicle exterior showing shell wrinkles, $\times 4$ , paratype, 110925a; (4) a well-preserved pedicle exterior, $\times 4$ , paratype, 110925b.	
Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
B. <i>Anisopleurella inaequistriata</i> Cooper, new species.....	805
(5) Large pedicle exterior, $\times 5$ , holotype, 110929a; (6, 7) two pedicle exteriors, $\times 4$ , paratypes, 110929b, 110929c; (9) impression of the brachial interior prepared by burning the shell, $\times 4$ , paratype, 110929d.	
Whitesburg formation (near top of middle third), $1\frac{1}{2}$ miles west of Bulls Gap, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.	

	Page
(8) Brachial interior, $\times 4$ , showing oblique ridge in low, bilobed disk, paratype, 110924. Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Bland County, Va.	
C. <i>Bilobia hemisphaerica</i> Cooper, new species.....	760
(10, 11) Pedicle and brachial views of a poorly preserved but complete specimen, $\times 1$ , paratype, 117462; (12-15) respectively brachial, posterior, side, and pedicle views, $\times 2$ , of the preceding specimen. Dark shale below Eureka quartzite, north slope of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.	
D. <i>Bilobia hemisphaerica</i> Cooper, new species.....	760
(16, 17) Brachial and pedicle views of a complete specimen, $\times 1$ , slightly compressed laterally, paratype, 111099a; (18) same as preceding, $\times 2$ , brachial view; (19-23) respectively anterior, posterior, pedicle, side, and brachial views, $\times 2$ , of the holotype, 111099b; (25, 26) respectively $\times 1$ and $\times 2$ enlargements of a complete specimen seen from the brachial side and from which the brachial valve has been dissolved to leave an impression of its interior showing the lobate disk, paratype, 111099c; (27) impression of the brachial interior showing form of muscle area, $\times 2$ , paratype, 111099d; (28) impression of another pedicle interior muscle area and the pits formed by prominent pseudopunctae, $\times 3$ , paratype, 111099e; (32) brachial interior, $\times 3$ , showing cardinalia and lobed disk with short median septum, paratype, 111099f. Oranda formation, $\frac{1}{2}$ mile west of Strasburg along railroad tracks, Strasburg (15') Quadrangle, Va.	
(24) Brachial view, $\times 3$ , of a complete specimen, paratype, 117461a; (36) interior of the brachial valve, $\times 3$ , showing cardinalia, paratype, 117461b. Oranda formation (lower), just west of junction of Virginia County Highways 617 = 910 and 777, on Highway 777, $\frac{1}{4}$ mile north of Green Mount Church, Broadway (15') Quadrangle, Va.	
(29-31) Umbonal, normal, and posterior views of a pedicle interior impression showing form of muscle area, ovarian impressions, and small median ridge, $\times 2$ , paratype, 111087a; (33) impression of the brachial interior, $\times 2$ , paratype, 111087b; (34) impression of another brachial interior showing slots produced by elevated disk, $\times 3$ , paratype, 111087c; (35) plasticine replica of the brachial interior, $\times 3$ , prepared from the preceding mold. Oranda formation, Guilford Springs, $2\frac{1}{2}$ miles southwest of Chambersburg, Chambersburg (15') Quadrangle, Pa.	

PLATE 194

BIOBIA, BIMURIA, DACTYLOGONIA, PALAEOSTROPHOMENA, TITANAMBONITES

A. <i>Bimuria lamellosa</i> (Bassler).....	767
(1) Brachial view of a complete specimen, $\times 1$ , hypotype, 110948b; (2) brachial view of a complete specimen, $\times 1$ , lectotype, 66168a; (3-7) respectively brachial, posterior, anterior, side, and pedicle views, $\times 2$ , of the lectotype; (8) pedicle view, $\times 1$ , of a paratype, 66168b; (9, 10) posterior and full views of the brachial interior, showing brachiophores and septa, $\times 2$ , hypotype, 110948f. Oranda formation, along the railroad $\frac{1}{2}$ mile west of Strasburg, Strasburg (15') Quadrangle, Va.	
B. <i>Titanambonites amplus</i> (Raymond).....	718
(11, 13-15) Respectively exterior, posterior, anterior, and side views of the pedicle valve, $\times 1$ , hypotype, 117416; (16) interarea of preceding, $\times 2$ . Arline formation, Knoxville, Tenn.	

	Page
(12, 17) Side and interior views of a silicified pedicle valve, $\times 1$ , hypotype, 117417; (18) interarea of preceding, $\times 2$ . Arline formation, in glade $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
C. <i>Palaeostrophomena angulata</i> Cooper, new species.....	702
(19, 20) Respectively impression of the pedicle interior and the plasticine replica of the interior prepared from it, $\times 2$ , paratype, 111085b; (21, 22) plasticine replica of the brachial interior and the mold from which it was prepared, $\times 2$ , paratype, 111085a. Botetourt formation, junction Virginia Highways 311 and 114, $\frac{1}{2}$ mile southwest of Catawba, Salem (15') Quadrangle, Va.	
D. <i>Dactylogonia</i> sp. 4.....	838
(23-27) Respectively pedicle, brachial, side, anterior, and posterior views of a complete specimen, $\times 2$ , figured specimen, 117609. Sevier formation, $\frac{1}{4}$ mile northeast of Miser, Louisville (T.V.A. 138-SE) Quadrangle, Tenn.	
E. <i>Dactylogonia magna</i> Cooper, new species.....	829
(28, 29) Brachial and pedicle views of a small specimen, $\times 1$ , paratype, 117592; (30) brachial view of the exterior, $\times 2$ , of the preceding specimen. Lincolnshire formation (Hogskin member), Sally Cleveland Farm, $\frac{3}{4}$ mile southwest of Washburn, Dutch Valley (T.V.A. 154-SW) Quadrangle, Tenn.	
F. <i>Bilobia hemisphaerica</i> Cooper, new species.....	760
(31) Brachial view of a complete specimen, $\times 1$ , paratype, 117460a; (32-36) respectively anterior, side, brachial, posterior, and pedicle views, $\times 2$ , of the preceding specimen. Martinsburg formation (part with <i>Brongniartella</i> and referable to the Salona formation), on Virginia Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.	

PLATE 195

ANISOPLEURELLA, BILOBIA, IDIOSPIRA, LEPTELLINA, TOQUIMIA, XENAMBONITES

A. <i>Anisopleurella tricostellata</i> Cooper, new species.....	806
(1) Brachial interior showing muscle area and septal ridges, $\times 5$ , paratype, 117475a; (2-5) respectively pedicle, brachial, anterior, and posterior views of a complete specimen, $\times 5$ , holotype, 117475b. Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
B. <i>Bilobia virginicensis</i> Cooper, new species.....	762
(6, 7) Two views of the pedicle interior showing the muscle area, $\times 2$ , paratype, 117465b; (8) brachial interior seen through the broken pedicle valve, $\times 2$ , showing the lobes of the muscle area, paratype, 117465a. Botetourt formation, in the field on the south side of the road, 0.2 mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.	
C. <i>Leptellina pulchra</i> Cooper, new species.....	753
(9) Brachial view of a small, complete specimen, $\times 3$ , paratype, 117442c; (10, 11) exterior and interior of the brachial valve showing cardinalia and disk, $\times 3$ , paratype, 117442d; (12) exterior of an imperfect pedicle valve, $\times 2$ , paratype, 117442e; (13) interior of the preceding pedicle valve, $\times 2$ , tilted to show the small muscle scars and the long pallial marks; (14) imperfect brachial interior showing the cardinalia and median ridge, $\times 3$ , paratype, 117442b; (15) posterior part of the brachial interior showing the cardinalia, $\times 8$ , paratype, 117442a;	

- (16) posterior view of the preceding,  $\times 8$ , showing the cardinal process and associated structures.
- Horizon and locality same as A above.
- D. *Xenambonites undosus* Cooper, new species..... 815  
 (17-20) Respectively posterior, anterior, pedicle, and brachial views of a complete but young specimen,  $\times 5$ , paratype, 117468f; (21-24) exterior, posterior, interior, and side views of the pedicle valve showing the deflected flange on the shell border, horizontal wrinkles on the exterior, and small *Leptellina*-like muscle scars,  $\times 4$ , paratype, 117468a; (25) exterior of the brachial valve,  $\times 4$ , holotype, 117468h; (26, 27, 29) brachial interior in three views; tilted to show visceral disk plate, normal view showing inner border and posterior view,  $\times 4$ , all of the holotype; (28, 30) interior and posterior views of the brachial interior showing the small disk area and the cardinalia,  $\times 6$ , holotype; (31) another brachial interior,  $\times 6$ , showing the disk region. This specimen was broken irretrievably when it was photographed.
- Horizon and locality same as A above.
- E. *Toquimia kirki* Ulrich and Cooper..... 698  
 (32) Impression of the pedicle interior showing the flabellate muscle scars and numerous pallial marks,  $\times 1\frac{1}{2}$ , hypotype, 117567f.
- Upper Pogonip group (lower *Rhysostrophia* bed), about 1 mile above the mouth of Ikes Canyon, Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.
- F. *Idiospira panderi* (Billings)..... 691  
 (33-37) Respectively pedicle, anterior, side, posterior, and brachial views of a complete specimen,  $\times 1$ , hypotype, 85329a.
- Tyrone formation, 2 miles south of High Bridge, Harrodsburg (30') Quadrangle, Ky.
- G. *Idiospira ? warthini* Cooper, new species..... 692  
 (38-41) Respectively pedicle, anterior, side, and brachial views of a complete specimen,  $\times 1$ , paratype, 117252a.
- Wappinger formation, railroad cut at Pleasant Valley, 6 miles northeast of Poughkeepsie, Poughkeepsie (15') Quadrangle, N. Y.
- H. *Idiospira panderi* (Billings)..... 691  
 (42-46) Respectively anterior, posterior, side, pedicle, and brachial views of a large and complete specimen,  $\times 1$ , hypotype, 117251a.
- Hull formation, Kirkfield, Ontario, Canada.

## PLATE 196

## SOWERBYELLA

- A. *Sowerbyella varicostellata* Cooper, new species..... 799  
 (1-5) Respectively pedicle, side, posterior, anterior, and brachial views,  $\times 2$ , of the holotype, 117532a; (6, 7) pedicle interiors,  $\times 2$ , paratypes, 117532c, 117532d; (8) interior of an imperfect brachial valve,  $\times 2$ , paratype, 117532b.
- Arline formation (middle), north side of wagon road in glade,  $\frac{1}{4}$  mile south-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- B. *Sowerbyella* sp. 4..... 803  
 (9-13) Respectively anterior, pedicle, brachial, side, and posterior views of a complete specimen,  $\times 2$ , figured specimen, 117548a; (14) brachial view of another complete specimen,  $\times 2$ , figured specimen, 117548b.
- Yellow shaly limestone above 25-foot sandstone of Eureka group, saddle just north of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.

	Page
C. <i>Sowerbyella silicica nana</i> Cooper, new subspecies.....	794
(15-19) Respectively anterior, posterior, side, brachial, and pedicle views, X 2, of the holotype, 98229a.	
Arline formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.	
D. <i>Sowerbyella silicica</i> Cooper, new species.....	793
(20-24) Respectively side, brachial, anterior, posterior, and pedicle views, X 2, of the holotype, 117517a; (25, 26) pedicle and brachial views of a complete specimen, X 2, paratype, 117517b.	
Horizon and locality same as preceding.	
E. <i>Sowerbyella bellarugosa</i> Ulrich and Cooper.....	777
(27) Exterior of the brachial valve, X 3, paratype, 92867a; (28) brachial interior showing cardinalia and septa, X 6, paratype, 92867-1; (29) exterior of the pedicle valve, X 3, lectotype, 92867e.	
Pogonip group (upper), about 1 mile above the mouth of Ikes Canyon, east side Toquima Range, Roberts Mountains (1°) Quadrangle, Nev.	
F. <i>Sowerbyella perplexa</i> Cooper, new species.....	790
(30-34) Respectively anterior, side, posterior, pedicle, and brachial views of a young specimen, X 2, paratype, 117508c; (39) brachial view, X 3, of preceding; (38) pedicle view of a full-grown specimen, X 2, paratype, 117508e; (40) brachial view of an imperfect specimen showing the ornamentation, X 3, paratype, 117508g; (41) exterior of a large brachial valve, X 2, paratype, 117508f; (42) interior of an imperfect pedicle valve showing muscle area, X 2, paratype, 117508d; (43) interior of an imperfect brachial valve, X 4, paratype, 117508i; (44) another imperfect brachial interior showing the cardinalia, X 3, paratype, 117508b.	
Chatham Hill formation, 1.2 miles S. 31° E. of Sharon Springs, Burkes Garden (15') Quadrangle, Va.	
(35-37) Anterior, brachial, and pedicle views of a well-preserved specimen, X 2, holotype, 117509a.	
Chatham Hill formation, Grayson Farm, 4 miles southwest of Bland, Bland County, Va.	
G. <i>Sowerbyella</i> sp. 3.....	803
(45) Brachial view, X 1, of the figured specimen, 117546; (46-50) respectively brachial, anterior, posterior, side, and pedicle views, X 2, of the preceding specimen.	
Lower part dark shale under Eureka quartzite, north-facing nose of hill 8167, Martins Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.	
H. <i>Sowerbyella compacta</i> Cooper, new species.....	778
(51-54, 56) Respectively brachial, pedicle, anterior, posterior, and side views of a complete specimen, X 2, paratype, 117484a; (55, 59) pedicle and brachial views of another complete specimen, X 2, paratype, 117484b; (57, 58) interiors of two brachial valves showing cardinalia and septa, X 3, paratypes, 117484d, 117484c.	
Benbolt formation, 0.9 mile northeast of Heiskell, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.	

PLATE 197

SOWERBYELLA

A. <i>Sowerbyella negritus</i> (Willard).....	788
(1, 2) Pedicle and brachial views of a specimen showing the ornamentation, X 2, hypotype, 117504a; (3) pedicle view of another specimen, X 2, hypotype, 117504c.	



- Botetourt formation, junction Virginia Highways 311 and 114,  $\frac{1}{2}$  mile southwest of Catawba, Salem (15') Quadrangle, Va.
- (4-8) Respectively anterior, posterior, pedicle, side, and brachial views of a complete specimen,  $\times 2$ , hypotype, 117505d.
- Effna formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- (9) Plasticine replica of the brachial exterior,  $\times 2$ , hypotype, 117506b; (10) exterior of the pedicle valve,  $\times 2$ , hypotype, 117506a.
- Horizon and locality same as preceding.
- B. *Sowerbyella compacta* Cooper, new species..... 778
- (11-14, 23) Respectively pedicle, side, posterior, anterior, and brachial views of a complete specimen,  $\times 2$ , paratype, 117485a; (21, 22) pedicle and brachial views of another complete specimen,  $\times 2$ , paratype, 117485b.
- Benbolt formation (lower), road corner  $\frac{1}{2}$  mile southwest of Fleanor Mill, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.
- (15, 17-20) Respectively posterior, pedicle, anterior, side, and brachial views of a complete specimen,  $\times 2$ , paratype, 117486c; (16) brachial view of another specimen,  $\times 2$ , paratype, 117486a; (24) interior of the brachial valve showing cardinalia and septa,  $\times 2$ , paratype, 117486b.
- Benbolt formation, 0.3 mile north-northwest of Memorial School, Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- C. *Sowerbyella aequistriata* (Willard)..... 775
- (25, 26) Respectively  $\times 1$  and  $\times 2$  enlargements of a complete specimen, somewhat narrower than usual, hypotype, 117478a; (27-31) respectively pedicle, side, anterior, posterior, and brachial views of a complete specimen,  $\times 2$ , hypotype, 117478f; (32, 33) respectively  $\times 1$  and  $\times 2$  enlargements of a well-formed individual showing somewhat alate cardinal extremities, hypotype, 117478g; (34) brachial interior,  $\times 2$ , showing cardinalia and septa, hypotype, 117478b.
- Wardell formation, bend of the railroad just west of Liberty Hill, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.
- D. *Sowerbyella variabilis* Cooper, new species..... 798
- (35, 36) Respectively  $\times 1$  and  $\times 2$  enlargements of a complete specimen, paratype, 117539b; (43) ornamentation of the preceding specimen,  $\times 5$ ; (37) brachial view of a complete specimen,  $\times 1$ , paratype, 117539a; (38-42) respectively anterior, posterior, brachial, side, and pedicle views,  $\times 2$ , of the preceding specimen.
- Bromide formation (Pooleville member—168 feet below massive limestone, *Oxoplecia gouldi* zone), Spring Creek, sec. 7, T. 2 S., R. 1 W., Murray County, Okla.

## PLATE 198

## SOWERBYELLA

- A. *Sowerbyella vulgata* Cooper, new species..... 801
- (1, 2) Respectively  $\times 1$  and  $\times 2$  enlargements of a complete specimen, paratype, 117543b; (3-6) respectively anterior, posterior, pedicle and side views of another complete specimen,  $\times 2$ , holotype, 117543a; (11) pedicle view,  $\times 1$ , of the holotype; (12-14) posterior, anterior, and brachial views of a complete specimen,  $\times 2$ , paratype, 117543f; (19) pedicle interior,  $\times 2$ , showing median ridge and diductor tracks, paratype, 117543d; (20) brachial interior showing cardinalia and septa,  $\times 2$ , paratype, 117543c.
- Bromide formation (Mountain Lake member), cut on Oklahoma Highway 18, 1.8 miles south of Sulphur, sec. 11, T. 1 S., R. 3 E., Murray County, Okla.
- (7-9, 15, 16) Respectively brachial, posterior, anterior, side, and pedicle views of a

complete specimen,  $\times 2$ , paratype, 117540a; (10) brachial view,  $\times 1$ , of the preceding; (17) pedicle interior,  $\times 3$ , showing the pallial marks, paratype, 117540b; (18) brachial interior,  $\times 3$ , showing cardinalia, paratype, 117540d; (21, 22) brachial and pedicle views of a small specimen showing variation in ornamentation,  $\times 2$ , paratype, 117540c.

Bromide formation (Mountain Lake member), Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.

B. *Sowerbyella socialis* Cooper, new species..... 794

(23) Brachial view of a complete specimen,  $\times 1$ , holotype, 117525a; (24-27) respectively brachial, posterior, anterior, and side views,  $\times 2$ , of the preceding specimen; (28) well-preserved specimen showing brachial view,  $\times 1$ , paratype, 98207b; (29, 30) same as preceding,  $\times 2$ , brachial and pedicle views; (43) brachial interior,  $\times 3$ , showing cardinalia and thickened anterior, paratype, 117525b; (31-35) respectively pedicle, brachial, side, anterior, and posterior views of a complete specimen,  $\times 2$ , paratype, 117523a; (41) pedicle interior,  $\times 3$ , showing muscles and pallial marks, paratype, 117527a; (44) brachial interior,  $\times 3$ , showing cardinalia, paratype, 117527c.

Wardell formation, Lloyd Carter's barn, 0.8 mile by road northeast of the school at Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

(36, 38) Brachial and anterior views of a complete specimen,  $\times 2$ , paratype, 117530b; (37, 39) side and brachial views of a specimen with more rectangular outline,  $\times 2$ , paratype, 117530a.

Wardell formation (*Sowerbyella* bed), Evans Ferry section, 0.8 mile north of Indian Creek, on U. S. Highway 25E, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.

(40) Interior of the pedicle valve,  $\times 2$ , showing exceptional development of the pallial markings, paratype, 117522.

Wardell part of Dryden formation, north side of Lone Mountain Creek, just west of the road to Straight Creek, 0.8 mile west of Lone Mountain Station, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.

(42) Pedicle interior,  $\times 3$ , showing muscle scars and pallial marks extending anteriorly from the diductor ends, paratype, 117524a.

Wardell formation, 1 mile north-northeast of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

PLATE 199

SOWERBYELLA

A. *Sowerbyella monilifera* Cooper, new species..... 785

(1) Brachial view of a complete specimen,  $\times 1$ , paratype, 117499a; (2-6) respectively anterior, posterior, brachial, side, and pedicle views,  $\times 2$ , of the same specimen; (7) brachial interior showing cardinalia and septa,  $\times 2$ , paratype, 117499b; (8) ornamentation of the brachial valve,  $\times 5$ , holotype.

Decorah formation (upper Ion member), cut on Highway 10,  $\frac{1}{4}$  mile west of Ellsworth, Lancaster (30') Quadrangle, Wis.

B. *Sowerbyella aequicostellata* Cooper, new species..... 774

(9, 12) Respectively  $\times 1$  and  $\times 2$  enlargements of a complete specimen, holotype, 117477f; (11) side view,  $\times 2$ , of the preceding specimen; (10) anterior view of a complete specimen,  $\times 2$  paratype, 117477g; (13, 14) pedicle views,  $\times 2$ , of two paratypes, 117477b, 117477a; (16) impression of the pedicle interior showing muscle scars,  $\times 2$ , paratype, 117477e; (17) brachial interior,  $\times 3$ , showing cardinalia, muscle area, and subdued septa, paratype, 117477d.

- Edinburg formation (*Cyrtonotella* zone), ravine at switch  $\frac{1}{8}$  mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.
- (15) Interior of the pedicle valve,  $\times 2$ , paratype, 117476a.
- Shippensburg formation (about 50 feet above the base of the Pinesburg member), railroad cut and field to the north,  $2\frac{1}{2}$  miles southwest of Marion, Chambersburg (15') Quadrangle, Pa.
- C. *Sowerbyella nasuta* Cooper, new species..... 787
- (18, 23) Brachial and pedicle views of a complete specimen,  $\times 2$ , paratype, 117503a; (19-21) side, posterior, and anterior views of a complete specimen,  $\times 2$ , the holotype, 117503b; (26, 27) pedicle and brachial views of the holotype,  $\times 3$ , showing interareas and pseudodeltidium; (22) pedicle exterior showing narrow median fold,  $\times 2$ , paratype, 117503c; (24) brachial exterior,  $\times 2$ , paratype, 117503g; (28, 29) respectively  $\times 2$  and  $\times 3$  enlargements of the pedicle interior showing the pallial trunks, paratype, 117503c; (30) another pedicle interior showing muscle and pallial marks,  $\times 3$ , paratype, 117503f; (31) brachial interior,  $\times 3$ , showing cardinalia and brachiophores, paratype, 117503d; (33) brachial interior,  $\times 2$ , paratype, 117503h.
- Chatham Hill formation, north slope of Walker Mountain, 2 miles south-southwest of Chatham Hill, Chatham Hill (T.V.A. 218-NE) Quadrangle, Va.
- (25) Pedicle view of a complete specimen,  $\times 3$ , paratype, 117502a; (32, 34) interior views of two brachial valves,  $\times 3$ , paratypes, 117502b, 117502c.
- Ward Cove formation (*Nidulites* bed), southwest of Tazewell in Thompson Valley, Pounding Mill (15') Quadrangle, Va.

## PLATE 200

## SOWERBYELLA

- A. *Sowerbyella compacta* Cooper, new species..... 778
- (1-5) Respectively posterior, anterior, brachial, side, and pedicle views,  $\times 2$ , of the holotype, 117487a; (6) brachial interior showing cardinalia,  $\times 2$ , paratype, 117487b.
- Benbolt formation, 1 mile west of Rye Cove, second cut west of McDavid's house, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- B. *Sowerbyella socialis crassa* Cooper, new subspecies..... 796
- (7) Brachial view of a complete specimen,  $\times 1$ , holotype, 117528a; (8-12) respectively brachial, pedicle, anterior, posterior, and side views,  $\times 2$ , of the holotype; (14) enlargement  $\times 6$ , of the exterior of the holotype.
- Wardell formation, Lloyd Carter's barn, 0.8 mile by road northeast of Rye Cove School, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- (13) Pedicle interior, showing pallial marks,  $\times 3$ , paratype, 117529b.
- Wardell formation, on U. S. Highway 25E, 50 yards north of the intersection at Thorn Hill, Avondale (T.V.A. 162-NW) Quadrangle, Tenn.
- C. *Sowerbyella subcarinata* (Ulrich)..... 797
- (15, 16) Brachial interiors,  $\times 2$ , hypotypes, 117543a, 117543b; (17) pedicle exterior showing carina and wrinkles along the posterior margin,  $\times 2$ , hypotype, 117543c; (18) slab showing numerous individuals,  $\times 2$ , hypotype, 117543d.
- Carters formation (*Oxoplecia* bed), quarry 0.3 mile north of Gate City, Leeds (15') Quadrangle, Ala.

## PLATE 201

## SOWERBYELLA

- A. *Sowerbyella curdsvillensis* (Foerste)..... 780
- (1-3) Pedicle, brachial, and side views,  $\times 1$ , of a hypotype, 117491c; (4-7) re-

- Page
- spectively brachial, posterior, anterior, and side views,  $\times 2$ , of the same hypotype; (8) brachial view of a complete specimen,  $\times 2$ , hypotype, 117491i; (9) brachial view of an obese individual,  $\times 2$ , hypotype, 117491b; (10) interior of the pedicle valve showing the long diductor scars,  $\times 2$ , hypotype, 117491g; (11) brachial interior,  $\times 2$ , showing cardinalia and muscle scars, hypotype, 117401e; (12, 13) respectively  $\times 2$  and  $\times 3$  views of a very perfect brachial interior showing the cardinalia and pallial marks, hypotype, 117491h.
- Martinsburg formation (base), on Tennessee Highway 33, about  $\frac{1}{2}$  mile south of Rose Hill and  $5\frac{1}{2}$  miles northeast of Maynardville, Maynardville (T.V.A. Quadrangle, Tenn.
- B. *Sowerbyella lebanonensis* Bassler..... 782
- (14-18) Respectively brachial, anterior, pedicle, side and posterior views of a complete specimen,  $\times 2$ , hypotype, 117494a; (23, 24) brachial interiors showing cardinalia, muscle marks, and anterior thickening,  $\times 2$ , hypotypes, 117494b, 117494c.
- Lebanon formation, cut on U. S. Highway 41, 2.1 miles north of the Bedford County line in Rutherford County, Tenn.
- (19) Exterior of the pedicle valve,  $\times 2$ , lectotype, 80487a; (22) brachial interior of a young specimen,  $\times 2$ , paratype, 80487b; (25) small slab showing two brachial interiors,  $\times 3$ , showing cardinal process and septa, hypotype, 117495a.
- Lebanon formation, Shelbyville, Bedford County, Tenn.
- (20) Brachial exterior of a specimen having prominent wrinkles on the posterior margin,  $\times 2$ , hypotype, 117497c.
- Lebanon formation, near Prospect, Giles County, Tenn.
- (21) Interior of the pedicle valve showing median ridge and muscle area,  $\times 2$ , hypotype, 117496a.
- Lebanon formation, Columbia, Maury County, Tenn.

## PLATE 202

## SOWERBYELLA

- A. *Sowerbyella compacta* Cooper, new species..... 778
- (1) Pedicle view of a complete specimen,  $\times 1$ , paratype, 117490; (2-6) respectively brachial, pedicle, anterior, side, and posterior views,  $\times 2$ , of the same specimen.
- Benbolt formation (basal 20 feet with *Echinospaerites*),  $\frac{1}{4}$  mile east of Speers Ferry, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- (7) Interior of the pedicle valve,  $\times 2$ , showing pallial marks, paratype, 117483b; (8) brachial interior showing cardinalia,  $\times 2$ , paratype, 117483c.
- Dryden formation, Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.
- B. *Sowerbyella parva* Cooper, new species..... 789
- (9, 11) Side and brachial views of a complete specimen,  $\times 2$ , paratype, 117507b; (10, 12, 13) brachial, posterior, and anterior views of a complete specimen,  $\times 2$ , holotype, 117507a; (14) interior of the pedicle valve,  $\times 3$ , paratype, 117507c; (15) interior of the brachial valve,  $\times 3$ , showing septa and cardinalia, paratype, 117507d.
- Ward Cove formation, small cemetery about  $\frac{3}{8}$  mile north of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Tenn.
- C. *Sowerbyella vulgata* Cooper, new species..... 801
- (16-20) Respectively brachial, anterior, side, posterior, and pedicle views of a complete specimen,  $\times 2$ , paratype, 117542a; (22) ornamentation of brachial valve,  $\times 6$ , of preceding specimen; (21) brachial interior showing cardinalia and

- Page
- septa,  $\times 2$ , paratype, 117542b; (23) pedicle interior showing Y-shaped ridge and muscles,  $\times 2$ , paratype, 117542e.
- Bromide formation (Mountain Lake member),  $\frac{1}{4}$  mile west of U. S. Highway 77, SW $\frac{1}{4}$  sec. 25, T. 2 S., R. 1 E., Carter County, Okla.
- D. *Sowerbyella indistincta* Cooper, new species..... 782
- (24) Pedicle interior,  $\times 2$ , paratype, 117493b; (25) pedicle exterior,  $\times 2$ , holotype, 117493a; (26) slab showing interiors of three pedicle valves and a brachial exterior,  $\times 2$ , paratype, 117493c.
- Bromide formation (Mountain Lake member), about the middle of sec. 33, T. 2 S., R. 2 E., about 2 miles northeast of Springer, Carter County, Okla.
- E. *Sowerbyella variabilis* Cooper, new species..... 798
- (27) Brachial view of a small specimen showing aberrant fasciculation of costellae,  $\times 1$ , paratype, 117538a; (28, 29) brachial and pedicle views,  $\times 2$ , of the preceding specimen; (30) brachial view of the same specimen,  $\times 4$ , showing the bundling of costellae; (31, 32) pedicle and brachial views of a specimen preserving the attenuate cardinal extremities,  $\times 2$ , paratype, 117536a; (33) brachial view of a complete specimen,  $\times 1$ , holotype, 117536b; (34-38) respectively anterior, posterior, pedicle, side, and brachial views,  $\times 2$ , of the holotype.
- Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, about center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.
- (39, 40) Two brachial interiors,  $\times 2$ , showing cardinalia and septa, paratypes, 117535b and 117535c.
- Bromide formation (Pooleville member—370 to 390 feet above base), creek bed just west of U. S. Highway 77, north of culvert near store, SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec. 25, T. 2 S., R. 1 E., Carter County, Okla.

## PLATE 203

## EOPLECTODONTA, SOWERBYELLA

- A. *Sowerbyella plicatifera* Cooper, new species..... 791
- (1) Brachial view of a complete specimen showing the folds which inspired the specific name,  $\times 1$ , paratype, 117512a; (2, 3) pedicle and brachial views,  $\times 2$ , of the preceding specimen; (7) brachial view of a complete specimen,  $\times 1$ , holotype, 117512b; (8-11) respectively brachial, posterior, anterior, and side views,  $\times 2$ , of the preceding specimen; (12) brachial view of another complete specimen,  $\times 1$ , paratype, 117511a; (4-6, 13, 14) respectively posterior, anterior, side, brachial, and pedicle views,  $\times 2$ , of the preceding specimen; (15) enlargement of the ornamentation of the brachial valve,  $\times 6$ , of the preceding specimen.
- Bromide formation (Mountain Lake member), Decker's section, zone 3, at Nebo, Murray County, Okla.
- B. *Eoplectodonta ? triradiata* (Butts)..... 812
- (16-18) Two pedicle views and side view of a partially exfoliated specimen,  $\times 2$ , hypotype, 123257a; (19) immature specimen not yet geniculated,  $\times 2$ , holotype, 97582b; (20) somewhat larger specimen than the preceding but not geniculated to the extent shown by specimen figured in 16-18,  $\times 2$ , paratype, 97582a.
- Oranda formation,  $\frac{1}{2}$  mile west of Strasburg, along railroad tracks, Strasburg (15') Quadrangle, Va.
- C. *Sowerbyella cava* Cooper, new species..... 777
- (21-24) Respectively posterior, pedicle, brachial, and side views of a nearly perfect specimen,  $\times 3$ , paratype, 117480a; (25, 26) pedicle and anterior views of a well-preserved pedicle valve,  $\times 2$ , paratype, 123258a; (27) brachial view of

a large complete specimen,  $\times 2$ , paratype, 123258b; (28-30) anterior, posterior, and exterior views of a large pedicle valve,  $\times 2$ , paratype, 123258c.

Oranda formation, on Virginia County Road 777, just west of the junction of Virginia County Roads 617 = 910 and 777,  $\frac{1}{4}$  mile north-northwest of Green Mount Church, Broadway (15') Quadrangle, Va.

D. *Sowerbyella cava* Cooper, new species..... 777

(31-35) Respectively brachial, posterior, anterior, pedicle, and side views of a complete specimen,  $\times 2$ , paratype, 117481e; (36) brachial view of a complete specimen,  $\times 1$ , holotype, 117481b; (40-42) anterior, posterior, and brachial views,  $\times 2$ , of the holotype; (37-39) brachial, pedicle, and side views of a complete, full-grown specimen,  $\times 2$ , paratype, 117481a; (43) interior of the brachial valve showing septa, muscle scars, and cardinalia,  $\times 3$ , paratype, 117481f.

Martinsburg formation (part with *Brongniartella* and referable to Salona formation), 0.15 mile north of Green Mount Church on Virginia County Highway 617 = 910, Broadway (15') Quadrangle, Va.

PLATE 204

SOWERBYELLA

A. *Sowerbyella medioplicata* Cooper, new species..... 784

(1-5) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen,  $\times 2$ , holotype, 117498.

Lincolnshire formation (top), Tumbling Run,  $1\frac{1}{2}$  miles southwest of Strasburg, Strasburg (15') Quadrangle, Va.

B. *Sowerbyella* sp. 2..... 802

(6, 12) Respectively  $\times 1$  and  $\times 2$  enlargements of the brachial side of a complete specimen, figured specimen, 117545b; (7-11) respectively side, posterior, anterior, brachial, and pedicle views of a large, complete specimen,  $\times 2$ , figured specimen, 117545a.

Rodman member of Nealmont formation, 1 mile northeast of Bellefonte, Bellefonte (15') Quadrangle, Pa.

C. *Sowerbyella eximia* Cooper, new species..... 781

(13) Brachial view of a complete specimen with rounded cardinal extremities,  $\times 1$ , paratype, 117492c; (14-18) respectively anterior, posterior, side, brachial, and pedicle views,  $\times 2$ , of the preceding specimen; (19) another adult specimen, brachial view,  $\times 1$ , paratype, 117492j; (20) brachial view of a specimen showing wrinkles on the hinge margin,  $\times 2$ , paratype, 117492k; (21, 22) pedicle and brachial view of a large specimen,  $\times 2$ , holotype, 117492a; (29) posterior of the preceding specimen,  $\times 2$ , showing the interareas and cardinal process; (23-27) respectively brachial, side, pedicle, posterior, and anterior views of a large specimen,  $\times 2$ , paratype, 117492d; (28) brachial view of a medium-sized specimen showing the ornamentation,  $\times 2$ , paratype, 117492h; (30, 31) respectively  $\times 1$  and  $\times 2$  enlargements of a brachial interior, showing the cardinalia, paratype, 117492p; (32) another brachial interior of a specimen somewhat narrower than the preceding,  $\times 2$ , paratype, 117492f; (33) interior of a large brachial valve showing papillose interior, septa, and cardinalia,  $\times 3$ , paratype, 117492n.

Martinsburg formation (part with *Brongniartella* and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.

PLATE 205  
SOWERBYELLA

- |   | Page |
|---|------|
| A. <i>Sowerbyella socialis</i> Cooper, new species.....   | 794  |
| (1-5) Respectively posterior, pedicle, side, anterior, and brachial views of a complete specimen, $\times 2$ , paratype, 117526a; (6) enlargement of the ornamentation of a brachial valve, $\times 6$ , paratype, 117526b.   |      |
| Wardell formation ( <i>Hesperorthis</i> zone), Lloyd Carter's barn, 0.8 mile by road northeast of Rye Cove School, Clinchport (T.V.A. 188-NW) Quadrangle, Va.   |      |
| B. <i>Sowerbyella eximia</i> Cooper, new species.....   | 781  |
| (7, 8) Impression of the pedicle interior and a wax replica prepared from the impression, showing muscle scars, $\times 2$ , paratype, 117492g.   |      |
| Martinsburg formation (part with <i>Brongniartella</i> and referable to the Salona formation), on Virginia County Highway 617=900, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.  |      |
| C. <i>Sowerbyella punctostriata</i> (Mather).....   | 792  |
| (9-13) Respectively anterior, posterior, brachial, pedicle, and side views of a complete specimen, $\times 2$ , hypotype, 117514a; (23) brachial interior, $\times 3$ , showing cardinalia, septa, and pallial marks, hypotype, 117514b.  |      |
| Barnhart formation, Koch Valley School, on U. S. Highway 61, NE. corner SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 6, T. 41 N., R. 6 E., 2 miles south of Barnhart, Kimmswick (15') Quadrangle, Mo.   |      |
| (14) Brachial view of a complete specimen, $\times 1$ , hypotype, 117513a; (15-19) respectively brachial, anterior, side, pedicle, and posterior views of the preceding specimen, $\times 2$ , showing ornamentation; (22, 24) respectively $\times 2$ and $\times 1$ enlargements of the brachial interior, showing cardinalia, hypotype, 117513b. |      |
| Barnhart formation, 0.1 mile south of Salt River on U. S. Highway 61, north of New London, Ralls County, Mo.  |      |
| (20, 25) Exterior and interior views of a pedicle valve, $\times 1$ , hypotype, 117515a; (21) exterior of a brachial valve, $\times 1$ , hypotype, 117515b.   |      |
| Barnhart formation (upper), old road about 1 mile northwest of Chicago Summer School Camp, NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 32, T. 37 N., R. 9 E., Weingarten (15') Quadrangle, Mo.   |      |

PLATE 206  
SOWERBYELLA, TITANAMBONITES

- |   |     |
|---|-----|
| A. <i>Sowerbyella angulata</i> Cooper, new species.....   | 776 |
| (1-5) Respectively pedicle, posterior, anterior, brachial, and side views $\times 1$ , of the holotype, 71538a; (6) the same, $\times 2$ , to show the ornamentation; (7) interior of the brachial valve, $\times 2$ , paratype, 117479b. |     |
| Hermitage formation, Cliff Avenue section, Clifton Terrace, Birmingham, Birmingham Special (15') Quadrangle, Ala.   |     |
| B. <i>Sowerbyella vulgata</i> Cooper, new species.....  | 801 |
| (8) Brachial view, $\times 1$ , of a wide paratype, 117541a; (9-12) respectively side, brachial, anterior, and pedicle views, $\times 2$ , of the preceding.  |     |
| Bromide formation (Mountain Lake member—upper 10 feet), on Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.  |     |
| C. <i>Titanambonites amplius</i> (Raymond).....   | 718 |
| (13) Impression of the interior of a pedicle valve showing long diductor scars and the pallial trunks at their anterior ends, $\times 1$ , hypotype, 117423b.   |     |
| Fetzer tongue, at the bend of the road 0.6 mile south-southeast of Harrison-Chilhowee Academy, Walden Creek (T.V.A. 156-SW) Quadrangle, Tenn.   |     |

- |   | Page |
|---|------|
| D. <i>Sowerbyella punctostriata</i> (Mather).....   | 792  |
| (14, 15) Respectively $\times 1$ and $\times 2$ views, showing ornamentation, of a topotype, 117516.  |      |
| Rockland formation, Wolfe Island, Lake Ontario between Kingston and Cape Vincent, N. Y.   |      |
| E. <i>Sowerbyella monilifera</i> Cooper, new species.....   | 785  |
| (16, 17, 21, 22, 25) Respectively pedicle, brachial, posterior, side, and anterior views of a complete specimen, $\times 2$ , holotype, 117500b; (18) enlargement of the central portion of the brachial valve, $\times 4$ , of the holotype; (19, 20) respectively $\times 1$ and $\times 2$ views of a paratype, 117500a; (23, 24) pedicle and brachial views of a complete specimen showing growth stages, $\times 2$ , paratype, 117500c; (26) interior of the pedicle valve showing muscle scars, $\times 2$ , paratype, 117500g; (27, 28) interior of the same brachial valve, $\times 2$ and $\times 4$ , showing cardinalia, paratype, 117500i. |      |
| Decorah formation (Ion member), 1.1 miles east of U. S. Highway 52, south edge of Cannon Falls, Goodhue County, Minn.   |      |

## PLATE 207

## EOPLECTODONTA

- |  |     |
|--|-----|
| A. <i>Eoplectodonta ? dubia</i> Cooper, new species.....   | 810 |
| (1) Somewhat exfoliated pedicle exterior, $\times 2$ , paratype, 110984.   |     |
| Edinburg formation ( <i>Cyrtonotella</i> zone), ravine on south side railroad, $\frac{1}{2}$ mile west of Strasburg, Strasburg (15') Quadrangle, Va.   |     |
| B. <i>Eoplectodonta alternata</i> (Butts).....   | 808 |
| (2) Pedicle view of a young specimen, $\times 4$ , hypotype, 110985.   |     |
| Oranda formation, along the railroad $\frac{1}{2}$ mile west of Strasburg, Strasburg (15') Quadrangle, Va.   |     |
| (3) Exterior of the pedicle valve, $\times 1$ , hypotype, 117551q; (4-7) respectively posterior, anterior, side, and pedicle views, $\times 2$ , of the preceding specimen; (8, 9) exterior and posterior views of another pedicle valve showing ornamentation, $\times 1$ , hypotype, 111798a; (10, 11) posterior and full views of the preceding pedicle valve, $\times 2$ , showing the ornamentation; (12-14, 25) anterior, brachial, posterior, and side views of a complete specimen, $\times 1$ , hypotype, 117550d; (15, 16) brachial and pedicle views of the preceding specimen, $\times 2$ , showing the ornamentation; (17) posterior of the brachial view of the same specimen, $\times 3$ , showing pseudodeltidium and alternating character of the ornamentation; (18) brachial view of another complete specimen, $\times 2$ , showing ornamentation and the interareas, hypotype, 117550b; (19) exterior of pedicle valve showing anterior folds, $\times 1$ , hypotype, 117551-1; (20, 21) posterior and anterior views of the brachial interior, $\times 2$ , showing septa, cardinalia, and pallial marks, hypotype, 117551g; (22, 23) posterior and anterior views of another brachial interior showing the septa, $\times 3$ , hypotype, 117551n; (24) posterior view of another brachial interior showing the septa, $\times 2$ , hypotype, 111798b. |     |
| Martinsburg formation (part with <i>Brongniartella</i> and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.   |     |

## PLATE 208

## EOPLECTODONTA, LEPTAENA

- |  |     |
|--|-----|
| A. <i>Eoplectodonta alternata</i> (Butts).....   | 808 |
| (1, 2) Exterior and tilted view of a large pedicle valve, $\times 2$ , hypotype, 79419a; |     |



(3) side view of a complete specimen,  $\times 1$ , hypotype, 79419d; (6, 7) two views of an impression of the pedicle interior,  $\times 2$ , showing the muscle scars, hypotype, 79419e; (18) exterior of a small pedicle valve,  $\times 4$ , hypotype, 79419f; (14) brachial interior,  $\times 2$ , showing 3 septa, hypotype, 79419g.

Oranda formation,  $\frac{1}{2}$  mile west of Strasburg along the railroad, Strasburg (15') Quadrangle, Va.

- (4) Plasticine replica of a complete specimen seen from the brachial side,  $\times 2$ , hypotype, 110993c; (5) plasticine replica of the exterior of a large brachial valve,  $\times 2$ , hypotype, 110993d; (8) impression of the pedicle interior showing the muscle scars and the pallial marks extending anteriorly,  $\times 2$ , hypotype, 110993f; (9) another pedicle interior impression showing muscle scars and pallial marks,  $\times 2$ , hypotype, 110993e; (10, 11) respectively  $\times 1$  and  $\times 2$  enlargements of an impression of the pedicle interior showing the muscle scars and the pallial marks extending anteriorly, hypotype, 110993a; (12, 13) another impression of the pedicle interior in full view and tilted to show the muscle scars,  $\times 2$ , hypotype, 110993g; (15, 16) plasticine replica of the brachial interior showing the muscle scars, 3 septa, and denticles along the hinge and the mold from which the cast was prepared,  $\times 2$ , hypotype, 110993b; (17) plasticine replica of the brachial interior showing cardinalia and septa,  $\times 2$ , hypotype, 110993h.

Oranda formation, north side of road, 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.

- B. *Leptaena ordoviciica* Cooper, new species..... 820  
 (19, 20) Side and exterior views of a pedicle valve,  $\times 1$ , paratype, 117666; (21) exterior view,  $\times 2$ , of the preceding specimen.  
 Martinsburg formation (*Simuites* zone), Carlisle, Carlisle (15') Quadrangle, Pa.

## PLATE 209

## EOPLECTODONTA, GONIOTREMA, SOWERBYITES

- A. *Eoplectodonta foerstei* Cooper, new species..... 811  
 (1) Immature pedicle valve,  $\times 2$ , showing wrinkles along the posterior margin, paratype, 110992d; (2, 3) respectively  $\times 1$  and  $\times 2$  enlargements of a pedicle valve, holotype, 110992a.  
 Wells formation, along the railroad  $1\frac{1}{4}$  miles southwest of Cumberland City, Stewart County, Tenn.
- B. *Sowerbyites triseptatus* (Willard)..... 730  
 (4, 5) Respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior showing the callosities at the anterior ends of the diductor scars, hypotype, 117413a; (6, 7) respectively  $\times 2$  and  $\times 1$  enlargements of the brachial interior, showing the median septum, hypotype, 117413b.  
 Lincolnshire formation (Hogskin member), along U. S. Highway 25E, north of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.
- C. *Eoplectodonta ? dubia* Cooper, new species..... 810  
 (8) Impression of the pedicle interior,  $\times 2$ , paratype, 117555b; (9) impression of the brachial interior,  $\times 2$ , paratype, 117555f; (10) plasticine replica of the brachial interior,  $\times 2$ , prepared from the preceding; (11) another plasticine replica of the brachial interior,  $\times 2$ , showing septa, paratype, 117555g; (12) plasticine replica of the pedicle exterior,  $\times 2$ , holotype, 117555d; (13) plasticine replica of the brachial exterior of a small specimen,  $\times 2$ , paratype, 117555h.  
 Botetourt formation, junction Virginia Highways 731 and 724, 2 miles northwest of Brownsburg, Lexington (15') Quadrangle, Va.

- |   | Page |
|---|------|
| D. <i>Goniotrema perplexum</i> Ulrich and Cooper.....   | 711  |
| <p>(14, 16) Interior and exterior of the pedicle valve, <math>\times 1</math>, of the holotype, 92872;<br/>           (15, 17) exterior and interior of the brachial valve, <math>\times 1</math>, of the holotype; (18)<br/>           posterior view of the brachial valve of the holotype, <math>\times 2</math>, showing cardinalia;<br/>           (19) brachial valve of the holotype, <math>\times 2</math>, interior; (20) pedicle interior of the<br/>           holotype, <math>\times 2</math>, showing the elongate diductor scars; (21, 22) respectively <math>\times 1</math><br/>           and <math>\times 2</math> views of the apex of the holotype showing pedicle foramen.</p> <p>Upper Pogonip group, Ikes Canyon, east side of Toquima Range, Roberts<br/>           Mountains (1°) Quadrangle, Nev.</p> |      |

## PLATE 210

## BIMURIA, CHRISTIANIA, ISOPHRAGMA

- |  |     |
|--|-----|
| A. <i>Bimuria parvula</i> Cooper, new species.....   | 769 |
| <p>(1) Pedicle exterior, <math>\times 2</math>, holotype, 117469d; (2) brachial view, <math>\times 3</math>, of the<br/>           holotype; (3) pedicle interior, <math>\times 2</math>, paratype, 117469f; (4) brachial interior<br/>           showing septa, <math>\times 3</math>, paratype, 117469e.</p> <p>Chatham Hill formation, 1.2 miles S. 31° E. of Sharon Springs, Burkes<br/>           Garden (15') Quadrangle, Va.</p>  |     |
| B. <i>Bimuria</i> cf. <i>B. superba</i> Ulrich and Cooper.....   | 771 |
| <p>(5) Pedicle view showing bundled lamellae on the outer surface, <math>\times 1</math>, figured<br/>           specimen, 110964a.</p> <p>Effna formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady<br/>           (T.V.A. 218-NW) Quadrangle, Va.</p>   |     |
| C. <i>Bimuria ? matutina</i> Cooper, new species.....  | 768 |
| <p>(6-8) Posterior, side, and exterior views of a pedicle valve, <math>\times 3</math>, paratype, 66288a;<br/>           (9) same, <math>\times 2</math>; (10) another pedicle exterior, <math>\times 3</math>, holotype, 66288b.</p> <p>Boulder in Mystic conglomerate, Range 6, Lot 20, near Mystic, Stanbridge<br/>           Township, Quebec, Canada.</p>   |     |
| D. <i>Christiania platys</i> Cooper, new species.....  | 861 |
| <p>(11) Brachial interior, <math>\times 2</math>, paratype, 117574.</p> <p>Edinburg formation (<i>Nidulites</i> zone), 100 yards south of Battlefield Crystal<br/>           Caverns entrance on U. S. Highway 11, Hupp Hill, 1 mile north of Strasburg,<br/>           Strasburg (15') Quadrangle, Va.</p>  |     |
| E. <i>Bimuria</i> sp. 1.....   | 772 |
| <p>(13) Brachial view of an incomplete specimen, <math>\times 1</math>, figured specimen, 117473;<br/>           (12, 14) pedicle and brachial views of the preceding specimen, <math>\times 2</math>, showing<br/>           pedicle foramen.</p> <p>Dark shale under the Eureka quartzite, north-facing nose of hill 8167, Martins<br/>           Ridge, Monitor Range, Roberts Mountains (1°) Quadrangle, Nev.</p>  |     |
| F. <i>Bimuria superba</i> Ulrich and Cooper.....   | 771 |
| <p>(15, 16) Anterior and pedicle views of a pedicle valve showing good develop-<br/>           ment of the exterior lamellae, <math>\times 1</math>, hypotype, 117471.</p> <p>Arline formation (top), small quarry on east side of Tennessee Highway 66A,<br/> <math>\frac{1}{4}</math> mile northeast of St. Clair, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.</p>   |     |
| G. <i>Bimuria siphonata</i> Cooper, new species.....   | 770 |
| <p>(17, 21, 22) Brachial, anterior, and posterior views of a young complete speci-<br/>           men, <math>\times 5</math>, showing the pedicle siphon, holotype, 117470a; (18) brachial view of<br/>           the preceding enlarged <math>\times 8</math> to show the pedicle siphon, pseudodeltidium, and<br/>           chilidial plates; (19, 20) pedicle and side views of a somewhat larger specimen<br/>           than the preceding, <math>\times 5</math>, paratype, 117470d; (23, 24) two views of the same<br/>           brachial valve showing the cardinalia, septa, and serrated lateral lobes, <math>\times 5</math>,<br/>           paratype, 117470e.</p> |     |

- Page
- Pratt Ferry formation, 0.2 mile south of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- H. *Isophragma ponderosum* Cooper, new species..... 737
- (25) Plasticine replica of the pedicle exterior,  $\times 2$ , paratype, 123261; (31) pedicle exterior,  $\times 2$ , paratype, 123262a.
- Yellow-weathering limestone on 25-foot sandstone at base of Eureka group, 3 miles north of Martin Ranch on west side of hill 8167, Roberts Mountains (1°) Quadrangle, Nev.
- (26-30) Respectively anterior, pedicle, posterior, brachial, and side views of a complete specimen,  $\times 2$ , holotype, 123259a; (32) brachial view,  $\times 1$ , of the holotype.
- Yellow-weathering limestone on 25-foot sandstone at base of Eureka group, 2 miles north of Martin Ranch, Roberts Mountains (1°) Quadrangle, Nev.
- I. *Bimuria superba* Ulrich and Cooper..... 771
- (33, 34) Respectively  $\times 1$  and  $\times 1\frac{1}{2}$  enlargements of a large brachial valve, hypotype, 110981.
- Arline formation, quarry at Marion, Marion (T.V.A. 218-SE) Quadrangle, Va.

## PLATE 211

## BIMURIA

- A. *Bimuria immatura* Cooper, new species..... 766
- (1) Pedicle interior showing teeth and small pedicle siphon,  $\times 4$ , paratype, 110976j; (2) posterior view of the same specimen,  $\times 6$ , showing the foramen of the pedicle siphon; (13) another view of the same specimen,  $\times 6$ , showing the siphon more clearly; (3) interior of the brachial valve showing the divergent septa,  $\times 4$ , paratype, 110976n; (4) same specimen as preceding,  $\times 4$ , tilted to show brachial processes and median ridge; (5) anterior,  $\times 3$ , of the holotype, 110976g; (6) pedicle interior tilted to show teeth,  $\times 4$ , paratype, 110976k; (9-11) pedicle, brachial, and side views,  $\times 4$ , of the holotype; (7, 8) posterior and anterior views of two brachial interiors showing median plates and cardinalia,  $\times 4$ , paratypes, 110976m and 110976p; (12) brachial view of a small specimen,  $\times 6$ , showing pedicle siphon, paratype, 110976i.
- Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- B. *Bimuria superba* Ulrich and Cooper..... 771
- (15, 18) Interior of the brachial valve seen in normal view and tilted to show median septa and brachial processes,  $\times 2$ , paratype, 108200b; (14, 17) posterior views of the same specimen as shown in the preceding views,  $\times 3$ , showing the cardinal process and details of the median septa; (19, 23) respectively  $\times 1$  and  $\times 2$  views, showing foramen, cardinal process and chilidial plates, of the holotype, 108200a; (24) pedicle view,  $\times 1$ , of the holotype; (20) pedicle interior,  $\times 2$ , showing pallial markings, paratype, 108200f; (22) pedicle interior showing pallial marks,  $\times 1\frac{1}{2}$ , paratype, 108200c; (25) impression of the pedicle interior showing the pallial marks,  $\times 1\frac{1}{2}$  (specimen later etched for brachial interior).
- Arline formation (middle), north side of wagon road in glade,  $\frac{1}{2}$  mile south-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- (16, 21) Interior and exterior of a pedicle valve,  $\times 1$ , showing details of the pallial marks, paratype, 108201.
- Arline formation, 6 to 10 miles southeast of Loudon, Loudon (30') Quadrangle, Tenn.

PLATE 212

BIMURIA, LEPTAENA

- A. *Bimuria lamellosa* (Bassler)..... Page 767
- (1) Brachial interior,  $\times 2$ , paratype, 66168d; (4, 10) posterior and normal views of another brachial valve,  $\times 3$ , showing septa and cardinalia, hypotype, 110948a; (5, 8) pedicle and brachial views,  $\times 1$ , of the lectotype, 66168a; (6) brachial view of another complete specimen,  $\times 1$ , hypotype, 110948b; (9) beak region of the preceding,  $\times 3$ , showing chilidium; (7) pedicle interior,  $\times 3$ , showing the foramen and teeth, hypotype, 110948c.
- Oranda formation, along the railroad  $\frac{1}{4}$  mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.
- (2) Impression of the pedicle interior showing the pallial trunks,  $\times 2$ , hypotype, 110949c; (3) impression of the brachial interior, showing slots representing the septa,  $\times 2$ , hypotype, 110949a.
- Oranda formation, 1 mile northwest of Guilford Springs,  $2\frac{1}{2}$  miles southwest of Chambersburg, Chambersburg (15') Quadrangle, Pa.
- B. *Bimuria buttsi* Cooper, new species..... Page 765
- (11) Pedicle interior showing pallial marks and pedicle foramen,  $\times 2$ , paratype, 110933d; (13) posterior portion of the brachial valve,  $\times 2$ , showing septa, paratype, 110934c; (15) brachial interior,  $\times 2$ , of a young specimen, paratype, 110933e; (17) pedicle interior,  $\times 2$ , showing pallial marks, paratype, 110934b; (26) exterior,  $\times 1$ , of same specimen; (18) brachial interior,  $\times 2$ , paratype, 110932e; (20) exterior of the pedicle valve,  $\times 1$ , showing lamellae, paratype, 110932a; (22, 23) brachial and pedicle views of a complete specimen showing the great development of lamellae on the surface,  $\times 1$ , holotype, 110934a; (27) posterior of pedicle valve showing foramen and deltidium,  $\times 4$ , paratype, 123264; (29, 30) respectively  $\times 1$  and  $\times 2$  enlargements of an unusual pedicle valve showing extravagant development of the lamellae, paratype, 110933c; (31) anterior view of an adult specimen,  $\times 1$ , paratype, 110933a.
- Little Oak formation, intersection of Bailey Gap and main roads, SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 13, T. 19 S., R. 2 W.,  $1\frac{3}{4}$  miles northeast of Newhope Church, Vandiver (15') Quadrangle, Ala.
- (12) Interior of the brachial valve of a young specimen,  $\times 2$ , paratype, 110930a; (14, 24) respectively  $\times 1$  and  $\times 3$  views, showing the pedicle foramen, deltidium, chilidial plates, and cardinal process, paratype, 71506a; (16) brachial exterior of a young specimen showing the exterior lamellae,  $\times 1$ , paratype, 110930b; (19) brachial interior of a very young specimen,  $\times 2$ , paratype, 110930d; (21, 28) respectively  $\times 1$  and  $\times 3$  enlargements of the brachial view of a complete specimen, showing pedicle foramen, pseudodeltidium, chilidial plates, and cardinal process, paratype, 110930c.
- Little Oak formation,  $\frac{1}{2}$  mile north of Pelham, 660 feet east of intersection Cahaba Valley and Helena roads, Bessemer Iron District (15') Quadrangle, Ala.
- (25) Interior of an adult brachial valve,  $\times 2$ , paratype, 110935a.
- Little Oak formation, quarry north of Pelham, Bessemer Iron District (15') Quadrangle, Ala.
- C. *Leptaena ordovicica* Cooper, new species..... Page 820
- (32) Exterior of a small brachial valve,  $\times 2$ , paratype, 117665. This is the earliest known true *Leptaena* yet found in North America.
- Edinburg formation (just above siltstone), on Hiatt Run, 200 yards east of U. S. Highway 11, 3 miles north of Winchester, Winchester (15') Quadrangle, Va.

## PLATE 213

## CRASPEDELIA, HESPERINIA, ISOPHRAGMA, PTYCHOGLYPTUS, RHIPIDOMENA, STROPHOMENA

	Page
A. <i>Craspedelia marginata</i> Cooper, new species.....	773
(1-4) Respectively exterior, posterior, anterior, and interior views of the pedicle valve, $\times 4$ , showing pedicle siphon and deflected anterior flanges, paratype, 117474a; (5, 6, 8, 10) respectively exterior, anterior, interior, and posterior views of another pedicle valve, $\times 3$ , holotype, 117474b; (7, 9) anterior and interior views of the preceding specimen, $\times 6$ , showing pedicle siphon in both views; (11-13) anterior, tilted, and normal views of a brachial valve showing the cardinalia and septum, $\times 4$ , paratype, 117474c; (14, 15) two views of another, old-age brachial valve showing the cardinalia and ridges, $\times 6$ , paratype, 117474d; (16) the brachial interior showing the deflected flange, $\times 4$ , paratype, 117474e; (17) the preceding brachial interior, $\times 5$ , tilted to show the flange; (18) exterior view of the preceding specimen, $\times 5$ , with complete outline restored; (19) exterior showing the hypercline interarea, $\times 6$ , paratype, 117474f; (20) chilidial structures, ca. $\times 10$ , of the preceding specimen.	
Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
B. <i>Isophragma</i> sp. 1.....	740
(21) Interior of a small brachial valve showing cardinalia and median septal plates, $\times 3$ , figured specimen, 123286.	
Horizon and locality same as preceding.	
C. <i>Ptychoglyptus pulchrus</i> Butts = <i>P. virginiensis</i> Willard.....	818
(22) Exterior view of a well-preserved pedicle valve, $\times 3$ , hypotype, 123285d.	
Horizon and locality same as preceding.	
D. <i>Rhipidomena</i> sp. 1.....	873
(23, 24) Brachial and pedicle views of an incomplete specimen with outlines restored, $\times 1$ , figured specimen, 117699a.	
Arline formation, north side of the wagon road through glade, $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
E. <i>Hesperinia kirki</i> Cooper, new species.....	822
(25) Pedicle interior, $\times 2$ , showing the cardinalia, paratype, 117625.	
Upper Pogonip group, White Pine Range, White Pine County, Nev.	
F. <i>Strophomena</i> cf. <i>S. inspeciosa</i> Willard.....	939
(26-30) Respectively posterior, anterior, pedicle, side, and brachial views of a complete specimen, $\times 1$ , hypotype, 117728a; (31-34) respectively brachial, side, anterior, and posterior views of a specimen slightly larger than the preceding, $\times 1$ , hypotype, 117728b.	
Wardell formation ( <i>Hesperorthis</i> zone), cut on U. S. Highway 25E, Evans Ferry, $\frac{1}{2}$ mile north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.	
G. <i>Strophomena inspeciosa</i> Willard.....	939
(35-38) Respectively side, anterior, brachial, and pedicle views of a complete specimen, $\times 2$ , hypotype, 117725.	
Wardell formation (between <i>Hesperorthis</i> and <i>Sowerbyella</i> beds), same locality as preceding.	

## PLATE 214

## CHRISTIANIA

A. <i>Christiania trentonensis</i> Ruedemann.....	865
(1) Plaster replica of the brachial interior, $\times 2$ , cotype, New York State Mus.;	

- Page
- (2) rubber replica of the exfoliated brachial valve,  $\times 2$ , New York State Mus. Rysedorf conglomerate, Rysedorf Hill, near Albany, N. Y.
- B. *Christiania* cf. *C. platys* Cooper, new species..... 861  
 (3, 4) Pedicle and brachial views of a broad individual,  $\times 1$ , figured specimen, 117575; (5) brachial view of the preceding specimen,  $\times 2$ , showing pseudo-deltidium.  
 Little Oak formation,  $\frac{1}{2}$  mile north of the bridge on U. S. Highway 31, Pelham, Bessemer Iron District (15') Quadrangle, Ala.
- C. *Christiania subquadrata* (Hall)..... 862  
 (6-8) Pedicle, brachial, and side views of a complete but young specimen,  $\times 2$ , hypotype, 117579a.  
 Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- D. *Christiania subquadrata* (Hall)..... 862  
 (9-11) Brachial, pedicle, and side views of a complete specimen,  $\times 1$ , hypotype, 71501; (12-16) anterior, side, posterior, pedicle, and brachial views,  $\times 2$ , of the preceding specimen.  
 Little Oak formation,  $\frac{1}{2}$  mile north of Pelham and 660 feet east of the intersection of Cahaba Valley and Helena roads, Bessemer Iron District (15') Quadrangle, Ala.  
 (17) Brachial view of a complete specimen,  $\times 1$ , hypotype, 111013a.  
 Upper part of "Lenoir" limestone, 0.15 mile south of Pratt Ferry, Blocton (15') Quadrangle, Ala.  
 (18) Brachial view of a complete specimen,  $\times 1$ , hypotype, 111016a; (19) posterior part of preceding specimen enlarged  $\times 2$  to show apical foramen, pseudo-deltidium, and cardinal process; (26, 27) interior of two pedicle valves showing the complicated pallial sinuses,  $\times 2$ , hypotypes, 111020b, 111020c; (31, 36) brachial interior in full view and posterior view showing bilobed cardinal process, muscle platforms, brachiophores, and septa,  $\times 2$ , hypotype, 111020d; (32, 34, 35, 39) interior, anterior, side, and posterior views,  $\times 2$ , of a brachial interior showing septa, brachiophores, and cardinal process, hypotype, 111020a; (37) posterior view of the same brachial valve,  $\times 3$ , showing muscle platforms.  
 Arline formation (lower middle), opposite cabin 0.3 mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.  
 (20) Impression of the pedicle interior showing long pallial trunks,  $\times 2$ , hypotype, 111017b.  
 Athens formation (base), near Christiansburg, Sweetwater (T.V.A. 131-SW) Quadrangle, Tenn.  
 (21, 22) Impression of the pedicle interior and posterior view showing muscle scars,  $\times 2$ , hypotype, 111018a; (30) impression of the brachial interior showing the marks of the septa,  $\times 2$ , hypotype, 111018b; (23, 24) interior and posterior views of another pedicle interior showing pallial marks and muscle scars,  $\times 2$ , hypotype, 111021a; (29) another impression of the pedicle interior,  $\times 2$ , hypotype, 111021c.  
 Athens formation (base), just east of road intersection,  $2\frac{1}{2}$  miles southeast of Riceville, Calhoun (T.V.A. 125-SW) Quadrangle, Tenn.  
 (25, 28) Pedicle valves showing complicated pallial trunks of the interior,  $\times 2$ , hypotypes, 111029a and 111015.  
 Arline formation (middle), north side of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.  
 (33) Interior of a well-preserved brachial valve,  $\times 2$ , showing septa and small muscle platforms, hypotype, 117580j.

Arline formation, 100 yards southwest of the Negro Cemetery,  $\frac{1}{2}$  mile north-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

(38) Interior of a pedicle valve,  $\times 1$ , hypotype, 110999a.

Little Oak formation, 2 miles north of Pelham, Bessemer Iron District (15') Quadrangle, Ala.

## PLATE 215

## CHONETOIDEA, CHRISTIANA, SOWERBYELLA

- A. *Sowerbyella* cf. *S. nasuta* Cooper, new species..... 787  
 (1) Brachial view,  $\times 3$ , figured specimen, 117501; (2-4) respectively side, anterior, and posterior views,  $\times 2$ , of the same specimen.  
 Ward Cove formation (just above *Nidulites* zone), north of U. S. Highway 19,  $\frac{1}{4}$  mile west of Pounding Mill, Pounding Mill (15') Quadrangle, Va.
- B. *Christiana platys* Cooper, new species..... 861  
 (5) Impression of the pedicle interior showing the pallial trunks,  $\times 2$ , paratype, 111007; (8) exterior of a small pedicle valve,  $\times 1$ , paratype, 111011a; (9, 10) respectively  $\times 1$  and  $\times 2$  views of a large pedicle valve, holotype, 111011b.  
 Edinburg formation (*Cyrtonotella* zone), small glen about  $\frac{1}{8}$  mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.  
 (6, 7) Respectively  $\times 1$  and  $\times 2$  views of the brachial interior showing the ridges and flatness of the valve, paratype, 111004.  
 Edinburg formation (*Cyrtonotella* zone), quarry  $\frac{1}{4}$  mile east of the railroad station at Strasburg Junction, Strasburg (15') Quadrangle, Va.
- C. *Christiana* cf. *C. subquadrata* (Hall)..... 862  
 (11, 12) Pedicle and side views of an exceptionally long specimen,  $\times 1$ , figured specimen, 117577.  
 Edinburg formation (*Cyrtonotella* zone), ravine at switch  $\frac{1}{8}$  mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.
- D. *Christiana trentonensis brevis* Butts = *C. auriculata* Cooper, new species..... 860  
 (13) Pedicle valve,  $\times 2$ , figured specimen, 97536b.  
 Oranda formation, along the railroad  $\frac{1}{2}$  mile west of Strasburg, Strasburg (15') Quadrangle, Va.
- E. *Christiana subquadrata* (Hall)..... 862  
 (14-17) Respectively posterior, side, brachial, and pedicle views of a well-preserved specimen,  $\times 2$ , hypotype, 117578.  
 Edinburg formation (*Cyrtonotella* zone), dam on Shenandoah River  $1\frac{1}{2}$  miles N. 61° E. of Edinburg, Edinburg (15') Quadrangle, Va.  
 (18, 19) Side and pedicle views of another individual,  $\times 2$ , hypotype, 123363.  
 Edinburg formation (*Nidulites* zone), on U. S. Highway 11, 100 yards south of Battlefield Crystal Caverns entrance, 1 mile north of Strasburg, Strasburg (15') Quadrangle, Va.
- F. *Christiana auriculata* Cooper, new species..... 860  
 (20) Brachial view of a complete specimen,  $\times 1$ , holotype, 97537a; (21) posterior of the same specimen enlarged,  $\times 3$ , to show the pseudodeltidium and apical foramen; (27) brachial interior,  $\times 2$ , paratype, 97537b.  
 Oranda formation,  $\frac{1}{2}$  mile west of Strasburg, Strasburg (15') Quadrangle, Va.  
 (23, 26) Pedicle and brachial views of a large specimen,  $\times 1$ , paratype, 117571; (28) brachial view,  $\times 2$ , of same.  
 Oranda formation, junction of Virginia County Highways 691 and 692, west of Lantz Mills, Edinburg (15') Quadrangle, Va.  
 (22) Brachial view of another complete specimen,  $\times 2$ , paratype, 111005b; (24, 25) respectively side and brachial views of a complete specimen,  $\times 1$ , paratype, 117570.

	Page
Oranda formation, 200 yards on Virginia County Highway 616, southeast of U. S. Highway 11, 3.5 miles southwest of Mount Jackson, Mount Jackson (15') Quadrangle, Va.	
G. <i>Christiania platys</i> Cooper, new species.....	804
(29) Brachial interior of a silicified specimen, $\times 2$ , paratype, 117573. Edinburg formation (lower), 1½ miles south of Wadesville, Winchester (15') Quadrangle, Va.	
H. <i>Chonetoidea virginica</i> Cooper, new species.....	861
(30) Plasticine replica of the pedicle exterior, $\times 4$ , paratype, 111097a; (31) impression of the pedicle interior showing the small muscle marks, $\times 5$ , paratype, 111097b; (32) plasticine replica of the pedicle interior and exterior, $\times 4$ , prepared from the preceding mold; (33) impression of the brachial and pedicle interior, $\times 5$ , holotype, 111097c. Edinburg formation (Liberty Hall facies), bluff on the north fork of the Shenandoah River, ½ mile above the south fork, opposite the bridge at Riverton, Front Royal (15') Quadrangle, Va.	

## PLATE 216

## DACTYLOGONIA

A. <i>Dactylogonia</i> sp. 8.....	840
(1-3) Brachial, side, and pedicle views of a complete specimen, $\times 2$ , figured specimen, 117613a; (4) brachial view, $\times 1$ , of the same specimen. Potet formation (Yellow Branch member), road along Yellow Branch, 5 miles southeast of Rose Hill, Rose Hill (T.V.A. 161-NE) Quadrangle, Va.	
B. <i>Dactylogonia concentrica</i> Cooper, new species.....	826
(5) Brachial view of a complete specimen, $\times 1$ , holotype, 117583; (6, 7) brachial and pedicle views, $\times 2$ , of the holotype. Lincolnshire formation (Hogskin member), 1.7 miles northeast of Hall Cross-road, Fountain City (T.V.A. 146-SW) Quadrangle, Tenn.	
C. <i>Dactylogonia obtusa</i> Cooper, new species.....	832
(8) Pedicle view of a complete specimen, $\times 1$ , holotype, 117594i; (10, 11) side and brachial views of another specimen, $\times 1$ , paratype, 117594d; (9) interior of the brachial valve showing the plates arising from the valve floor, $\times 2$ , paratype, 117594h; (13) the same, $\times 2$ , tilted to the side to show the floor plates; (12) fragment of the pedicle interior showing the muscle scars, $\times 2$ , paratype, 117594c. Lincolnshire formation, Clinch Valley at Shiloh Church, near the center of the northwest subquad., Pressmens Home (T.V.A. 171-NE) Quadrangle, Tenn.	
D. <i>Dactylogonia geniculata</i> Ulrich and Cooper.....	827
(14, 26) Pedicle and brachial views, $\times 2$ , of the holotype, 108202a; (20, 24, 28-30) respectively brachial, pedicle, side, posterior, and anterior views, $\times 1$ , of the holotype; (15) brachial interior showing the floor plates, $\times 2$ , paratype, 108202g; (16) specimen seen from the side of the pedicle valve with a window cut in the pedicle valve to show the floor plates, $\times 2$ , hypotype, 117585f; (21) imperfect brachial interior showing floor plates, $\times 2$ , paratype, 108202d; (17) interior of another brachial valve showing cardinalia, floor plates, peripheral rim, and pallial marks, $\times 2$ , hypotype, 117585h (missing); (18) pedicle interior showing muscle area, $\times 1$ , paratype, 108202b; (22) same specimen, $\times 2$ , tilted to show median ridge; (19) another pedicle interior showing a thickened muscle area, $\times 2$ , hypotype, 117585b; (23) posterior of a complete specimen, $\times 2$ , showing apical foramen and pseudodeltidium, paratype, 108202f; (25) pedicle interior, $\times 2$ , showing form of muscle scars and faint median ridge, hypotype, 117585c; (27) poste-	



rior part of the brachial valve showing the cardinalia, floor plates, and median ridge,  $\times 3$ , paratype, 108202c.

Arline formation (middle to upper), both sides of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

## PLATE 217

## DACTYLOGONIA, MURINELLA, Genus and Species Undet.

- A. *Murinella* sp. 2..... 851  
 (1) Pedicle view of a large specimen,  $\times 1$ , figured specimen, 117648a.  
 Tulip Creek formation, west branch of Sycamore Creek, sec. 27, T. 3 S., R. 4 E., Johnston County, Okla.
- B. *Murinella parva* Cooper, new species..... 848  
 (2, 3) Brachial and pedicle views of a complete specimen,  $\times 2$ , holotype, 117643.  
 Whistle Creek formation, on U. S. Highway 60, 100 yards southeast of Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.
- C. *Dactylogonia transversa* Cooper, new species..... 836  
 (4) View of the brachial interior from the ventral side,  $\times 1$ , and showing the floor plates, holotype, 117604b; (5) brachial view,  $\times 1$ , of the preceding specimen.  
 Botetourt formation, between U.S. Highway 60 and Whistle Creek, 1 mile northwest of Lexington, Lexington (15') Quadrangle, Va.
- D. Genus and species undet..... 1006  
 (6) Posterior of the pedicle valve showing interarea and pseudodeltidium,  $\times 1$ , figured specimen, 117066; (7) pedicle view of the same specimen,  $\times 1$ , showing ornamentation.  
 Arline formation (middle), north side of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- E. *Dactylogonia* sp. 3..... 838  
 (8-10) Pedicle, side, and brachial views of a complete specimen,  $\times 3$ , figured specimen, 117608.  
 Benbolt formation, west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- F. *Dactylogonia marmorata* Cooper, new species..... 831  
 (11, 12) Exterior and anterior views of a pedicle valve,  $\times 2$ , paratype, 123265d; (13) exterior view of another pedicle valve,  $\times 2$ , holotype, 123265b; (14) exterior of a young pedicle valve,  $\times 2$ , paratype, 123265a; (15) plasticine replica of the brachial exterior,  $\times 2$ , mold paratype, 123265c.  
 Murat formation, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.
- G. *Dactylogonia* sp. 7..... 839  
 (16, 18) Respectively  $\times 1$  and  $\times 2$  enlargements of the brachial view of a small specimen, figured specimen, 117612a; (17, 19) respectively  $\times 1$  and  $\times 2$  enlargements of another but larger specimen seen from the brachial side, figured specimen, 117612b.  
 Whistle Creek formation,  $1\frac{1}{2}$  miles northwest of Lexington, Lexington (15') Quadrangle, Va.
- H. *Murinella cancellata* Cooper, new species..... 846  
 (20-22) Brachial, side, and pedicle views of a large, complete specimen,  $\times 1$ , holotype, 117631.  
 Benbolt formation, west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

	Page
I. <i>Dactylogonia</i> sp. 5.....	838
(23-26) Respectively pedicle, posterior, anterior, and side views of a complete specimen, $\times 2$ , figured specimen, 117610.	
Effna formation, Porterfield Quarry, 5 miles east of Saltville Maccrady (T.V.A. 218-NW) Quadrangle, Va.	
J. <i>Dactylogonia subaequicostellata</i> Cooper, new species.....	836
(27, 28) Pedicle and brachial views of a complete specimen, $\times 1$ , paratype, 117603.	
Bromide formation (Mountain Lake member), between Sylvan and Mill Creeks, on the west branch of Sycamore Creek, sec. 27, T. 3 S., R. 4 E., Carter County, Okla.	
(29-31) Pedicle, side, and brachial views of another complete specimen, $\times 1$ , paratype, 117601b.	
Bromide formation (Mountain Lake member), McLish Ranch, sec. 24, T. 1 S., R. 7 E., Johnston County, Okla.	
K. <i>Dactylogonia obsoleta</i> (Butts).....	831
(32-34) Pedicle, side, and brachial views of a large specimen, $\times 1$ , holotype, 71505.	
Little Oak formation, 600 feet east of intersection of Cahaba Valley and Helena roads, $\frac{1}{2}$ mile north of Pelham, Bessemer Iron District (15') Quadrangle, Ala.	
L. <i>Dactylogonia obtusa</i> Cooper, new species.....	832
(35-37) Pedicle, side, and brachial views of a complete specimen, $\times 1$ , paratype, 117596.	
Arline formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.	
M. <i>Dactylogonia geniculata</i> Ulrich and Cooper.....	827
(38, 39) Pedicle and brachial views of an imperfect specimen, $\times 2$ , hypotype, 117588a.	
Little Oak formation, junction of Bailey Gap and main roads, $1\frac{3}{4}$ miles north-east of Newhope Church, Cahaba Valley, SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 19 S., R. 2 W., Vandiver (15') Quadrangle, Ala.	

## PLATE 218

## DACTYLOGONIA, RHIPIDOMENA

A. <i>Dactylogonia parva</i> Cooper, new species.....	834
(1-3) Anterior, side, and exterior view of a pedicle valve, $\times 3$ , holotype, 117597a.	
Lincolnshire formation (Hogskin member— <i>Oligorhynchia</i> bed), 0.4 mile east-northeast of Red Hill, 4 miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.	
B. <i>Dactylogonia geniculata</i> Ulrich and Cooper.....	827
(4-6) Brachial, brachial tilted to show interarea, and pedicle views of a complete specimen, $\times 2$ , hypotype, 117586a; (7) brachial view, $\times 1$ , of same specimen as preceding.	
Arline formation (middle), north side of wagon road in glade, $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
C. <i>Rhipidomena mesleri</i> Cooper, new species.....	868
(8, 9) Pedicle and brachial views of a complete specimen, $\times 2$ , paratype, 117674a;	
(10) brachial view, $\times 1$ , of the same specimen.	
Horizon and locality same as A above.	
D. <i>Dactylogonia alternata</i> Cooper, new species.....	825
(11, 12) Respectively $\times 1$ and $\times 2$ enlargements of the pedicle exterior, paratype, 117582a; (13, 14) respectively $\times 1$ and $\times 2$ enlargements of the exterior of the brachial valve, paratype, 117582b.	

- Page
- Lenoir formation (basal 13 feet above the Mosheim limestone), south side of Friends Church, north corner of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- E. *Dactylogonia* sp. 6..... 839  
 (15, 16) Respectively  $\times 1$  and  $\times 2$  enlargements of a pedicle valve with well-preserved ornamentation, figured specimen, 117611a.  
 Probably Benbolt formation (0 to 30 feet above the 225-foot marble), section north of Eidson, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.
- F. *Dactylogonia sculpturata* Cooper, new species..... 835  
 (17, 18) Brachial and side views of a complete specimen,  $\times 1$ , paratype, 117598b;  
 (19-21) pedicle, posterior, and brachial views,  $\times 2$ , of the same specimen.  
 Bromide formation (Mountain Lake member), McLish Ranch, sec. 24, T. 1 S., R. 7 E., Johnston County, Okla.
- G. *Dactylogonia alternata* Cooper, new species..... 825  
 (22, 23) Pedicle and anterior views,  $\times 1$ , of a well-preserved pedicle valve, paratype, 117581a; (24) pedicle view,  $\times 2$ , of the preceding specimen; (25) posterior view of a complete specimen showing the pedicle foramen, chilidium, and inter-areas,  $\times 3$ , holotype, 117581c; (28) brachial view,  $\times 2$ , of the preceding specimen; (26, 29) pedicle and brachial views of a young specimen not completely geniculated,  $\times 2$ , paratype, 117581b; (27) brachial view of a complete specimen,  $\times 1$ , paratype, 117581e; (30) interior of the brachial valve,  $\times 2$ , paratype, 117581d.  
 Lenoir formation (shaly band near top of granular beds underlying the Mosheim limestone), southwest side of the cemetery behind Friends Church, north corner of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

## PLATE 219

## DACTYLOGONIA, LEPTELLINA

- A. *Dactylogonia subaequicostellata* Cooper, new species..... 836  
 (1) Brachial interior showing the two sets of floor plates,  $\times 3$ , paratype, 117601c.  
 Bromide formation (Mountain Lake member), McLish Ranch, sec. 24, T. 1 S., R. 7 E., Johnston County, Okla.
- B. *Dactylogonia extensa* Cooper, new species..... 827  
 (2, 3) Exterior and side views of the pedicle valve,  $\times 1$ , holotype, 117584b;  
 (4, 5) respectively  $\times 1$  and  $\times 2$  enlargements of a somewhat exfoliated brachial valve, paratype, 117584a.  
 Mingan formation (lower third), Bald Island, Mingan Group, St. Lawrence River.
- C. *Dactylogonia subaequicostellata* Cooper, new species..... 836  
 (6-8) Posterior, brachial, and pedicle views of a complete specimen, showing foramen and pseudodeltidium,  $\times 2$ , holotype, 117602; (9) pedicle view,  $\times 1$ , of the same specimen.  
 Bromide formation (Mountain Lake member), 2 miles southeast of McLish Ranch, Johnston County, Okla.
- D. *Dactylogonia sculpturata* Cooper, new species..... 835  
 (10) Brachial view of a large, complete specimen,  $\times 1$ , holotype, 117598a.  
 Horizon and locality same as A above.
- E. *Dactylogonia geniculata* Ulrich and Cooper..... 827  
 (11) Pedicle interior showing well the outline of the muscle area,  $\times 2$ , hypotype, 117585c.  
 Arline formation (middle), north side of wagon road in glade,  $\frac{1}{4}$  mile south-east of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.

	Page
F. <i>Dactylogonia geniculata</i> Ulrich and Cooper.....	827
(12, 13) Pedicle and brachial views of a complete specimen damaged on the extremities, $\times 1$ , hypotype, 117587.	
Arline formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.	
G. <i>Leptellina pulchra</i> Cooper, new species.....	753
(14) Interior of brachial valve, $\times 3$ , showing cardinalia and visceral region, paratype, 123284.	
Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
H. <i>Dactylogonia</i> sp. 2.....	838
(15) Impression of the pedicle interior showing the muscle scars, $\times 2$ , figured specimen, 117607a.	
Botetourt formation, junction of Virginia Highways 731 and 724, 2 miles northwest of Brownsburg, Lexington (15') Quadrangle, Va.	
I. <i>Dactylogonia incrassata</i> (Hall).....	828
(16, 17) Brachial and pedicle views of a complete specimen, $\times 2$ , hypotype, A.M.N.H. 25049/1; (18) side view, $\times 1$ , hypotype, 117589a; (19) posterior of a complete specimen showing the pseudodeltidium and chilidium, $\times 3$ , hypotype, 117589b; (20) interior of the pedicle valve, $\times 2$ , hypotype, A.M.N.H. 25049/2; (21) interior of the brachial valve showing floor plates and cardinalia, $\times 3$ , hypotype, A.M.N.H. 25049/3; (22) another brachial interior showing floor plates, $\times 2$ , hypotype, 117589c; (23) posterior view of the preceding specimen, $\times 3$ , showing cardinal process and floor plates.	
Crown Point formation, Sloop Bay, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
J. <i>Dactylogonia incrassata</i> (Hall).....	828
(24) Exterior view of the pedicle valve, $\times 1$ , hypotype, Carnegie Mus. 5446; (25-27) side, anterior, and normal views, $\times 2$ , of the preceding specimen.	
Horizon and locality same as preceding.	

## PLATE 220

## DACTYLOGONIA, LIMBIMURINA

A. <i>Dactylogonia obtusa</i> Cooper, new species.....	832
(1, 3, 4) Brachial, side, and pedicle views of a complete specimen, $\times 1$ , holotype, 117594i.	
Lincolnshire formation, Clinch Valley at Shiloh Church, near center northwest subquad., Pressmens Home (T.V.A. 171-NE) Quadrangle, Tenn.	
(2, 5) Brachial and pedicle views of a complete specimen, $\times 1$ , paratype, 117595.	
Lincolnshire formation, Marcem Quarry, 2 miles west of Gate City, Gate City (T.V.A. 188-NE) Quadrangle, Va.	
B. <i>Dactylogonia incrassata</i> (Hall).....	828
(6, 7) Brachial and pedicle views of a complete specimen, $\times 2$ , hypotype, 117593a;	
(8) brachial interior, $\times 3$ , showing floor plates and cardinalia, hypotype, 117593b.	
Crown Point limestone, Sloop Bay, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.	
C. <i>Dactylogonia magna</i> Cooper, new species.....	829
(9-12) Respectively exterior, side, normal, and brachial views, $\times 1$ , of the holotype, 117591a; (16) brachial view of the holotype, $\times 1\frac{1}{2}$ , showing ornamentation and pseudodeltidium; (13-15) posterior, brachial, and pedicle views of a young specimen, $\times 2$ , paratype, 117591b; (17) pedicle interior showing form of muscle area, $\times 2$ , paratype, 117591d.	

- Page
- Lincolnshire formation (Hogskin member), 0.4 mile east-northeast of Red Hill, 4 miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.
- D. *Limbimurina insueta* Cooper, new species..... 853  
 (18, 21) Respectively  $\times 1$  and  $\times 2$  enlargements of a pedicle exterior, showing the extravagant frill, holotype, 117659a; (19, 22) respectively  $\times 1$  and  $\times 2$  enlargements of another pedicle exterior, paratype, 117659b; (20, 23) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial exterior showing the large frill, paratype, 117659c.  
 Rodman member of Nealmont formation, old road north of Roaring Spring, Hollidaysburg (15') Quadrangle, Pa.

## PLATE 221

## BELLIMURINA, CHRISTIANIA, LATICRURA, LIMBIMURINA, PETRORIA, PHRAGMORTHIS

- A. *Laticrura heteropleura* Cooper, new species..... 980  
 (1) Brachial view of a perfect specimen,  $\times 1$ , holotype, 117263a; (2-6) respectively posterior, anterior, pedicle, side, and posterior views,  $\times 2$ , of the holotype.  
 Little Oak formation, junction of Bailey Gap and Cahaba Valley roads, SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 13, T. 19 S., R. 2 W., 1 $\frac{1}{2}$  miles northeast of Newhope Church, Vandiver (15') Quadrangle, Ala.
- B. *Christiania subquadrata* (Hall) (immature)..... 862  
 (7-9) Respectively posterior, pedicle, and brachial views of a small complete specimen,  $\times 4$ , showing apical foramen and small pedicle tube, hypotype, 123266a; (10) fragment of pedicle valve showing teeth and muscle scars,  $\times 4$ , hypotype, 123266b; (11) another pedicle interior showing narrow pseudo-deltidium,  $\times 4$ , hypotype, 123266c; (12) well-preserved pedicle interior showing interarea,  $\times 4$ , hypotype, 123266d; (13-15) interiors of three brachial valves showing ridges and small bilobed cardinal process,  $\times 4$ , respectively, hypotypes, 123266e-g.  
 Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- C. *Phragmorthis buttsi* Cooper, new species..... 510  
 (16-20) Respectively anterior, posterior, brachial, pedicle, and side views of a complete adult,  $\times 3$ , paratype, 116960e; (21, 22) brachial and anterior views of a young specimen,  $\times 2$ , paratype, 116960k.  
 Horizon and locality same as preceding.
- D. *Bellimurina compressa* Cooper, new species..... 855  
 (23) Brachial view,  $\times 1$ , of the holotype, 117653; (24-28) respectively posterior, anterior, side, brachial, and pedicle views,  $\times 2$ , of the holotype.  
 Bromide formation (Mountain Lake member), east side of cut on Oklahoma Highway 18, 1.8 miles south of Sulphur, Murray County, Okla.
- E. *Petroria rugosa* Wilson..... 746  
 (29, 30) Interior of the pedicle valve, tilted and in normal view, showing the long, thick vascula media,  $\times 2$ , cotype, G.S.C. 6754a; (31, 32) brachial interior,  $\times 2$ , in normal view and tilted to show the median septum and muscle scars, counterpart to the preceding pedicle valve; (33) the same valve,  $\times 3$ , showing median septum and cardinalia; (34) same,  $\times 3$ , tilted to show brachial processes; (35) posterior of the preceding,  $\times 3$ , showing the chlidial plates, sockets, and short brachial processes; (36) the same valve,  $\times 3$ , seen in side view. Note absence of cardinal process.  
 Beaverfoot formation, Palliser Pass, British Columbia, Canada.

- |    |   |             |
|----|---|-------------|
|    |   | Page<br>853 |
| F. | <i>Limbinurina insueta</i> Cooper, new species.....<br>(37, 38) Respectively $\times 1$ and $\times 2$ views of a brachial valve with large frill, paratype, 117658.<br>Rodman member of Nealmont formation (65 feet below the top), along the Pennsylvania RR., $\frac{1}{2}$ mile north of Roaring Spring, Hollidaysburg (15') Quadrangle, Pa.<br>(39, 40) Respectively $\times 1$ and $\times 2$ views of a pedicle valve with exceptionally long frill, paratype, 117660a; (41, 42) large brachial valve with incomplete frill, $\times 1$ and $\times 2$ , paratype, 117660b.<br>Rodman member of Nealmont formation (15 feet below the top), west end of quarry at Salona, Lock Haven (15') Quadrangle, Pa. |             |

## PLATE 222

## BELLIMURINA, LIMBIMURINA, STROPHOMENA

- |    |   |     |
|----|---|-----|
|    |   | 856 |
| A. | <i>Bellimurina concentrica</i> Cooper, new species.....<br>(1, 2) Respectively $\times 1$ and $\times 2$ enlargements of a pedicle exterior, holotype, 117650.<br>Pierce formation, Pierce Mill, just south of Walterhill, on Stone River, east side of bridge on Tennessee Highway 10, $7\frac{1}{2}$ miles north-northeast of Murfreesboro, Rutherford County, Tenn.  |     |
| B. | <i>Bellimurina parviplicifera</i> Cooper, new species.....<br>(3) Brachial interior showing cardinalia, $\times 2$ , paratype, 117651.<br>Lebanon formation, Columbia, Maury County, Tenn.  | 856 |
| C. | <i>Strophomena ? sculpturata</i> Bassler.....<br>(4) Brachial exterior, $\times 2$ , holotype, 66165.<br>Martinsburg formation ( <i>Sinuities</i> bed), 1 mile south of St. Thomas, Mercersburg (15') Quadrangle, Pa.   | 946 |
| D. | <i>Bellimurina</i> sp. 1.....<br>(5) Exterior of the pedicle valve, $\times 2$ , figured specimen, 117657a.<br>"Ottosee" = Benbolt ? formation, U. S. Highway 19, $2\frac{1}{2}$ miles west of Paint Lick, Tazewell (15') Quadrangle, Va.   | 858 |
| E. | <i>Limbinurina brevilibata</i> Cooper, new species.....<br>(6) Exterior of the pedicle valve, $\times 2$ , holotype, 117662a; (7, 8, 9) exteriors of three brachial valves, $\times 2$ , paratypes, respectively, 117662c, d, b.<br>Edinburg formation ( <i>Cyrtonotella</i> zone), along the railroad, $\frac{1}{8}$ mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.  | 852 |
| F. | <i>Bellimurina</i> sp. 2.....<br>(10) Brachial interior, $\times 2$ , showing cardinalia, figured specimen, Columbia Univ. 25873.<br>Wardell formation, 2 miles west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.  | 859 |
| G. | <i>Bellimurina charlottae</i> (Winchell and Schuchert).....<br>(11) Brachial view of a complete specimen, $\times 1$ , hypotype, Y.P.M. Schuchert Coll., S3620a; (12, 13) pedicle and brachial views of another complete specimen, $\times 2$ , hypotype, Y.P.M. Schuchert Coll., S3620b; (14) interior of the brachial valve showing the cardinalia, $\times 2$ , hypotype, Y.P.M. Schuchert Coll., S3619.<br>Decorah formation (Guttenberg member), St. Paul, Minn. | 855 |
| H. | <i>Bellimurina subquadrata</i> Cooper, new species.....<br>(15) Exterior of the pedicle valve, showing foramen and wrinkles, $\times 4$ , holotype, 117655a; (16) exterior of an imperfect brachial valve, $\times 4$ , paratype, 117655c; (17, 18) interiors of two brachial valves showing the cardinalia, $\times 4$ , paratypes, 117655d, 117655b.  | 857 |

Bromide formation (Mountain Lake member), slightly north of the middle of sec. 32, T. 2 S., R. 2 E., 2 to 3 miles northeast of Springer, Carter County, Okla.

## PLATE 223

## BELLIMURINA, CYPHOMENA, LIMBIMURINA, MURINELLA, PELONOMIA

- |   | Page |
|---|------|
| A. <i>Bellimurina sulcata</i> Cooper, new species.....  | 858  |
| (1) Exterior of the pedicle valve, $\times 1$ , holotype, 117654; (2, 3) side and pedicle views, $\times 2$ , of the holotype.  |      |
| Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.  |      |
| B. <i>Limbimurina brevilimbata</i> Cooper, new species.....   | 852  |
| (4) Fragment of brachial valve showing cardinalia and adductor ridges, $\times 3$ , paratype, 117661b.  |      |
| Botetourt formation, south side of the road, 0.2 mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.   |      |
| C. <i>Bellimurina parvuplicifera</i> Cooper, new species.....   | 856  |
| (5, 6) Respectively $\times 1$ and $\times 2$ views of the pedicle exterior, holotype, 117652.  |      |
| Lebanon formation (upper half), on U. S. Highway 41, 9.6 miles southeast of Murfreesboro, Rutherford County, Tenn.  |      |
| D. <i>Cyphomena homostriata</i> (Butts).....  | 843  |
| (7) Interior of the brachial valve showing the cardinalia and adductor ridges, $\times 4$ , hypotype, 117624.   |      |
| Oranda formation, along the railroad $\frac{1}{2}$ mile west of Strasburg, Strasburg (15') Quadrangle, Va.  |      |
| E. <i>Pelonomia delicatula</i> (Billings).....  | 699  |
| (8) Exterior of the pedicle valve, $\times 3$ , hypotype, 117558.   |      |
| Table Head series, 1 mile west of Aguathuna, Port-au-Port, Newfoundland.  |      |
| (9) Impression of the interior of the brachial valve, $\times 3$ , hypotype, 117557; (10) plasticine replica of the brachial interior, $\times 3$ , prepared from the preceding and showing the cardinalia and rows of pustules along the median line.    |      |
| Table Head series, Table Head, Newfoundland.  |      |
| F. <i>Murinella partita</i> Cooper, new species.....  | 847  |
| (11-15) Respectively pedicle, anterior, brachial, side, and posterior views, $\times 1$ , of the holotype, 117639; (16, 17) respectively $\times 1$ and $\times 2$ views of the brachial interior showing cardinalia and pallial marks, paratype, 117640. |      |
| Bromide formation (Mountain Lake member—reefy beds), west side Oklahoma Highway 18, 1.8 miles south of Sulphur, Okla.   |      |
| G. <i>Cyphomena ? radialis</i> (Okulitch).....  | 844  |
| (18) Pedicle exterior, $\times 1$ , of the holotype, McGill Univ. (no number).  |      |
| Leray formation = Chaumont, St. Vincent de Paul, Quebec.  |      |
| H. <i>Bellimurina charlottae</i> (Winchell and Schuchert).....  | 855  |
| (19-21) Respectively brachial, side, and pedicle views of a nearly perfect specimen, $\times 1$ , hypotype, 45358a; (22-24) respectively pedicle, brachial, and posterior views of the preceding, $\times 2$ , showing the foramen and pseudodeltidium.   |      |
| Decorah formation (Guttenberg member, <i>Rhinidictya</i> bed), West St. Paul, Minn.   |      |

## PLATE 224

## CYPHOMENA

- |  |     |
|--|-----|
| A. <i>Cyphomena angulata</i> Cooper, new species.....                                | 841 |
| (1-5) Respectively posterior, anterior, side, pedicle, and brachial views of a large |     |

and complete specimen, X 2, holotype, 117619a; (7) brachial interior showing cardinalia, X 2, paratype, 117619b.

Edinburg formation (*Cyrtototella* zone), ravine at switch, 1/8 mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.

(6) Brachial interior, X 3, paratype, 117616a.

Shippensburg formation (150 to 200 feet above the base), railroad cut 2 1/2 miles southwest of Marion, Chambersburg (15') Quadrangle, Pa.

(8) Impression of the pedicle interior showing the muscle area, X 3, paratype, 117614a.

Shippensburg formation (nodular shaly zone below *Nidulites*), road cut on U. S. Highway 40, just west of Conococheague Creek, 7 miles west of Hagerstown, Williamsport (15') Quadrangle, Md.

B. *Cyphomena homostriata* (Butts)..... 843

(9-11) Side, pedicle, and brachial views, X 2, of the holotype, 97545.

Oranda formation, along the railroad 1/2 mile west of Strasburg, Strasburg (15') Quadrangle, Va.

(12, 13) Brachial and pedicle views of a small specimen, X 2, hypotype, 117622.

Oranda formation, west side of U. S. Highway 11, about 1 mile southwest of Strasburg, Strasburg (15') Quadrangle, Va.

(14-18) Respectively anterior, posterior, brachial, side, and pedicle views of a complete specimen, X 2, hypotype, 117623a; (19) brachial view, X 1, of the preceding specimen.

Oranda formation, Shenandoah River, 1 1/2 miles N. 61° E. of Edinburg, Edinburg (15') Quadrangle, Va.

(20) Brachial interior, X 2, showing cardinalia and ridges, hypotype, 117615.

Oranda formation, 1 3/4 miles west of Kauffman and 3 1/2 miles north of Greencastle, Chambersburg (15') Quadrangle, Pa.

C. *Cyphomena angulata* Cooper, new species..... 841

(21, 22) Impression of the brachial interior and a plasticine replica prepared from it, X 2, paratype, 117618.

Shippensburg formation (base of *Nidulites* zone), road cut on U. S. Highway 40, west bank of Conococheague Creek, 7 miles west of Hagerstown, Williamsport (15') Quadrangle, Md.

D. *Cyphomena grandis* Cooper, new species..... 842

(23-27) Respectively anterior, postero-pedicle, pedicle, side, and posterior views of a small but complete specimen, X 1, holotype, 117621a; (35, 36) respectively X 1 and X 2 enlargements of the preceding specimen; (28-32) respectively postero-pedicle, partial-anterior, pedicle, side, and anterior views of a large and strongly geniculated pedicle valve, X 1, paratype, 117621b; (33, 34) respectively X 1 and X 2 enlargements of a complete individual, paratype, 117620.

Martinsburg formation (part with *Brongniartella* and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.

PLATE 225

DACTYLOGONIA, TERATELASMA

A. *Dactylogonia magnifica* Cooper, new species..... 830

(1, 3) Interior and exterior of the pedicle valve, X 2, showing pseudodeltidium, foramen, and muscle marks, holotype, 117942a; (2) exterior of the brachial valve, X 2, paratype, 117942d; (4) interior of the brachial valve, X 4, showing adductor ridges and cardinalia, paratype, 117942c.



- |   | Page |
|---|------|
| Lower Ward Cove formation, $\frac{3}{4}$ mile southwest of Mount Eager Church, Hogskin Valley, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.   |      |
| B. <i>Teratelasma neumani</i> Cooper, new species.....  | 824  |
| (5-7) Respectively brachial, posterior, and pedicle views of a complete interior filling (steinkern), showing median septum, adductor ridges, and pits of the long adductor ridges on the side of the pedicle valve, $\times 3$ , holotype, 117938d (plug of pedicle foramen may be seen in posterior view); (8) plasticine replica of the brachial valve exterior, $\times 3$ , paratype, 117938g; (9) plasticine replica of another brachial valve exterior showing ornamentation in more detail, $\times 3$ , paratype, 117938e; (10, 11) impression of the interior of the brachial valve showing pits of cardinalia and septa, and plasticine replica of the interior prepared from it, $\times 3$ , paratype, 117938m; (12) impression of the interior of the pedicle valve showing muscle scars and pits at apex, representing prongs of cardinal process, $\times 3$ , paratype, 117938n; (13) exterior of another brachial valve, $\times 2$ , paratype, 117938-o; (14, 15) impression of the brachial interior and the plasticine replica prepared from it, $\times 3$ , paratype, 117938j; (16, 17) impression of the interior of the pedicle valve and the plasticine replica of the interior prepared from it, $\times 3$ , showing dental plates, paratype, 117938-l; (18) impression of the interior of the brachial valve broken along the median septum and showing the strong elevation of that structure, $\times 3$ , paratype, 117938q; (19, 20) impression of the interior of a pedicle valve and the plasticine replica of the interior prepared from it, $\times 3$ , paratype, 117938k; (21) plasticine replica of the interior of a brachial valve, $\times 3$ , paratype, 117938c; (22) plasticine replica of the exterior of the pedicle valve, $\times 3$ , paratype, 117938f; (23) another plasticine replica of the pedicle valve exterior, $\times 3$ , counterpart to fig. 12. |      |
| Sevier formation (Benbolt equivalent), 0.53 mile east-southeast of Old Kagley Church, Binfield (T.V.A. 139-NE) Quadrangle, Tenn.  |      |

## PLATE 226

## DACTYLOGONIA, MURINELLA

- |   |     |
|---|-----|
| A. <i>Murinella</i> sp. 3.....  | 851 |
| (1) Plasticine replica of the brachial exterior, $\times 1$ , figured specimen, 117649; (2) plasticine replica of the brachial interior, $\times 2$ , of the preceding specimen.<br>Little Oak formation, 1 mile north of Pelham, Bessemer Iron District (15') Quadrangle, Ala.   |     |
| B. <i>Murinella</i> sp. 1.....  | 850 |
| (3) Impression of the pedicle interior, $\times 1$ , figured specimen, 117647; (4) posterior of preceding, $\times 2$ , showing muscle scars.<br>Murfreesboro formation, east edge of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.  |     |
| C. <i>Dactylogonia incrassata</i> (Hall).....   | 828 |
| (5) Brachial view, $\times 1$ , of the hypotype, 117590a; (6-9) respectively side, pedicle, posterior, and brachial views, $\times 2$ , of the same hypotype.<br>Crown Point formation, Sloop Bay, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y.   |     |
| D. <i>Murinella muralis</i> Cooper, new species.....  | 846 |
| (10) Exterior of the pedicle valve, $\times 1$ , holotype, 117636a; (11, 12) two views of the interior of the preceding pedicle valve, $\times 2$ , one showing pseudodeltidium and interarea and the other the muscle area; (13) exterior of another pedicle valve larger than the preceding, $\times 1$ , paratype, 117636b; (16) posterior part of an imperfect specimen showing the interarea and pseudodeltidium, $\times 2$ , paratype, 117636d; (24) exterior of a large brachial valve, $\times 1$ , paratype, 117636c; |     |

(27, 28) interiors of two brachial valves,  $\times 2$ , showing the cardinalia, pallial marks, and subperipheral rim, paratypes, 117636e, 117636f.

Dryden formation, on the road to Tazewell,  $1\frac{1}{2}$  miles northeast of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.

(14, 15) Exterior and interior of a small pedicle valve,  $\times 1$ , paratype, 117637a; (21, 22) exterior and interior of brachial valve,  $\times 1$ , paratype, 117637b; (23) same brachial interior,  $\times 2$ .

Dryden formation (Wardell part), 1 mile west of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.

(17-19) Exterior, posterior, and interior of brachial valve,  $\times 2$ , showing cardinalia and septa, paratype, 117632a; (20) interior,  $\times 1$ , of the same specimen; (26) another brachial interior,  $\times 1$ , paratype, 117633.

Poteet formation (9-foot marble band = Yellow Branch member), on the road beside Yellow Branch, 5 miles southeast of Rose Hill, Rose Hill (T.V.A. 161-NE) Quadrangle, Va.

(25) Interior of a large pedicle valve showing strong subperipheral rim,  $\times 1$ , paratype, 117635c.

Wardell formation, Raccoon Valley,  $\frac{3}{4}$  mile northeast of Fleanor Mill, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.

PLATE 227

MURINELLA

- A. *Murinella semireducta* Cooper, new species..... 849
  - (1) Brachial view of the complete specimen before dissolving out the matrix with acid,  $\times 1$ , holotype, 117645; (2) interior of the posterior part of the brachial valve of the preceding specimen,  $\times 2$ , showing the muscle scars; (3, 4) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial interior of the same specimen, showing subperipheral rim and cardinalia; (5) posterior of the preceding valve,  $\times 2$ , showing the prongs of the cardinal process.
  - Lincolnshire formation (Hogskin member), Sally Cleveland Farm,  $\frac{3}{4}$  mile southwest of Washburn, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.
- B. *Murinella plana* Cooper, new species..... 849
  - (6, 7) Posterior and brachial views of a complete specimen,  $\times 2$ , holotype, 117644a.
  - Lincolnshire formation (Hogskin member), Evans Ferry, about 1 mile north of Indian Creek, on U. S. Highway 25E, Howard Quarter (T.V.A. 162-NE) Quadrangle, Tenn.
- C. *Murinella biconvexa* Cooper, new species..... 845
  - (8, 9) Brachial and pedicle views,  $\times 1$ , holotype, 117629a; (10-13) respectively pedicle, posterior, brachial, and side views,  $\times 2$ , of the holotype; (14) brachial view of another complete specimen,  $\times 2$ , paratype, 117630; (15, 16) pedicle and brachial views,  $\times 1$ , of another paratype, 117629b.
  - Horizon and locality same as A above.
- D. *Murinella partita* Cooper, new species..... 847
  - (17) Exterior of the brachial valve,  $\times 1$ , part of paratype, 117638; (18, 21) exterior and interior of the brachial valve,  $\times 1$ , part of same paratype; (19, 20) exterior and interior of the brachial valve,  $\times 2$ , showing ridges and cardinalia; (22) posterior of the brachial valve showing the cardinal process,  $\times 2$ ; (23, 24) exterior and interior of the pedicle valve,  $\times 2$ , showing the muscle area and median ridge; (25) posterior of the pedicle valve showing foramen and pseudo-deltidium,  $\times 2$ —all of paratype, 117638.
  - Bromide formation (Mountain Lake member—reef limestone), road cut, east

side, on Oklahoma Highway 18, sec. 11, T. 1 S., R. 3 E., 1.8 miles south of Sulphur, Murray County, Okla.

## PLATE 228

## CYPHOMENA, DACTYLOGONIA, LEPTAENA, MURINELLA

- |   | Page |
|---|------|
| A. <i>Cyphomena angulata</i> Cooper, new species.....   | 841  |
| (1-5) Respectively posterior, anterior, pedicle, side, and brachial views, $\times 2$ , of the paratype, 117617a; (6, 7) pedicle and brachial views, $\times 1$ , of the same specimen.   |      |
| Edinburg formation (lower part of <i>Nidulites</i> zone), east side of U. S. Highway 11, 100 yards south of the entrance to Battlefield Crystal Caverns, 1 mile north of Strasburg, Strasburg (15') Quadrangle, Va.   |      |
| B. <i>Leptaena ordovicica</i> Cooper, new species.....  | 820  |
| (8) Brachial interior showing ridges and pallial marks, $\times 2$ , paratype, 117667.  |      |
| Martinsburg formation (part with <i>Brongniartella</i> and referable to the Salona formation), on Virginia County Highway 617 = 910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.  |      |
| (9, 10) Respectively $\times 2$ and $\times 1$ enlargements of the pedicle exterior, holotype, 117669a; (11, 18) respectively $\times 2$ and $\times 1$ enlargements of the brachial interior showing cardinalia, paratype, 117669b.  |      |
| Oranda formation (top), slope on north side of Virginia County Highway 777, under barn, just west of junction of roads 777 and 617 = 910, about $\frac{1}{4}$ mile north of Green Mount Church, Broadway (15') Quadrangle, Va.  |      |
| (12) Poorly preserved pedicle valve, $\times 1$ , paratype, 117668.   |      |
| Carters formation (5 feet below top), top of old quarry 0.3 mile north of Gate City, Leeds (15') Quadrangle, Ala.   |      |
| (13, 14) Respectively $\times 2$ and $\times 1$ enlargements of the pedicle impression showing the muscle scars and the papillose interior, paratype, 117670a; (15) plasticine replica of the pedicle exterior, $\times 2$ , mold, paratype, 117670b; (16) impression of the brachial interior, $\times 2$ , paratype, 117670c. |      |
| Oranda formation, north side of road, 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.  |      |
| (17) Exterior of a small pedicle valve, $\times 1$ , paratype, 117664a.   |      |
| Rodman formation, Bellefonte, Bellefonte (15') Quadrangle, Pa.  |      |
| C. <i>Dactylogonia</i> sp. 1.....   | 837  |
| (19) Interior of a pedicle valve, $\times 2$ , figured specimen, 117605.  |      |
| Benbolt formation, $\frac{1}{4}$ mile north of the school at Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.   |      |
| D. <i>Murinella speciosa</i> Cooper, new species.....   | 850  |
| (20-22) Side, brachial, and pedicle views of a complete specimen, $\times 1$ , holotype, 117646; (23-26) respectively brachial, posterior, anterior, and pedicle views, $\times 2$ , of the preceding specimen.   |      |
| Lincolnshire formation (Hogskin member— <i>Oligorhynchia</i> zone), 0.4 mile east-northeast of Red Hill, 4 miles west-southwest of Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.   |      |

## PLATE 229

## FURCITELLA, HESPERINIA, HOLTEDAILINA

- |  |     |
|--|-----|
| A. <i>Furcitella scofieldi</i> (Winchell and Schuchert).....   | 878 |
| (1, 2) Pedicle and brachial views of a complete specimen, $\times 1$ , hypotype, 117748; (3-5) brachial, side, and pedicle views, $\times 2$ , of the same specimen. |     |
| Prosser formation ( <i>Zygospira</i> bed), St. Paul, Minn.   |     |

- |    |  |             |
|----|--|-------------|
|    |  | Page<br>879 |
| B. | <i>Holtedahlnia sulcata</i> (Verneuil).....  |             |
|    | (6) Brachial view of a complete specimen, $\times 1$ , figured specimen, 117747a; (8) brachial interior showing cardinalia, $\times 1\frac{1}{2}$ , figured specimen, 117747b.<br>Waynesville formation, Oregonia, Ohio.   |             |
|    | (7) Pedicle interior showing dental plates and muscle scars, $\times 1$ , figured specimen, 117744.<br>Whitewater formation, "Devils Backbone," Camden, Ohio.  |             |
| C. | <i>Hesperinia kirki</i> Cooper, new species.....   | 822         |
|    | (9-13) Respectively pedicle, brachial, anterior, posterior, and side views of a complete specimen, $\times 3$ , holotype, 117626a; (14) pedicle exterior, $\times 3$ , paratype, 117626c.<br>Tank Hill formation, ridge just east of Monument Canyon, Pioche (1°) Quadrangle, Nev.   |             |
|    | (15) Brachial interior, $\times 3$ , showing cardinalia indistinctly, paratype, 117627a.<br>Tank Hill formation, north end of the west side of Ely Springs Range, Highland Peak (15') Quadrangle, Nev.   |             |
| D. | <i>Furcitella plicata</i> Cooper, new species.....   | 877         |
|    | (16) Plasticine replica of the pedicle valve, $\times 2$ , prepared from mold, paratype, 117750a; (17) impression of the pedicle interior showing muscle scars and slits representing dental plates and their anterior extensions, $\times 2$ , counterpart to preceding mold; (18) plasticine replica of the brachial exterior, $\times 2$ , showing costellae and shell wrinkles, prepared from mold, holotype, 117750b; (19, 20) impression of the brachial interior, counterpart to the preceding mold, showing slots representing septal ridges and cardinalia, $\times 2$ , and the plasticine replica prepared from the brachial mold; (21) impression of a small pedicle interior, $\times 2$ , showing muscle scars, paratype, 117751a; (22) another pedicle interior impression showing the muscle scars and strong radial shell wrinkles, $\times 2$ , paratype, 117750c; (23, 24) impression of an old brachial interior, $\times 2$ , and the plasticine replica of the interior prepared from it, $\times 3$ , showing cardinalia and muscle area, paratype, 117751b; (25, 26) another impression of the brachial interior and the plasticine replica of the interior prepared from it, $\times 2$ , paratype, 117751c.<br>Oranda formation, in field to north of road, 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va. |             |

PLATE 230

MACROCOELIA, PLATYMENA

- |    |  |     |
|----|--|-----|
|    |  | 880 |
| A. | <i>Platymena plana</i> Cooper, new species.....  |     |
|    | (1, 10) Respectively $\times 1$ and $\times 2$ enlargements of the pedicle interior showing the form of the muscle area and its bounding ridges, paratype, 117759a; (2, 3) pedicle and brachial views of a complete specimen, $\times 1$ , holotype, 117759b; (4, 8) pedicle and brachial views of a small specimen, $\times 1$ , paratype, 117759c; (5, 7) pedicle and brachial views, $\times 2$ , of the preceding specimen; (6, 9) interior of two brachial valves showing the cardinalia, $\times 2$ , paratypes, 117759d, 117759e.<br>Arline formation, north side of wagon road in glade, $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn. |     |
| B. | <i>Platymena ? bellatula</i> Cooper, new species.....  | 880 |
|    | (11, 12) Pedicle and brachial views, $\times 2$ , of the holotype, 117758; (13) brachial view, $\times 1$ , of the holotype.<br>Bromide formation (Pooleville member—162 feet below the massive lime-  |     |

- Page
- stone), second dam on Spring Creek, northwest of Woodford, Murray County, Okla.
- C. *Macrocoelia obesa* Cooper, new species..... 895  
 (15, 16) Brachial and pedicle views,  $\times 1$ , of the holotype, 117783a; (19) ornamentation,  $\times 4$ , of the preceding specimen.  
 Arline formation (upper),  $\frac{1}{4}$  mile south of McMullens, Meadow (T.V.A. 139-NW) Quadrangle, Tenn.  
 (14, 18) Posterior part of two brachial interiors showing the cardinalia and septa associated with the muscle area, respectively  $\times 1$  and  $\times 2$ , paratype, 117782a; (17) part of pedicle interior showing flabellate muscle area,  $\times 1$ , paratype, 117782b.  
 Horizon and locality same as A above.

## PLATE 231

## GLYPTOMENA, MACROCOELIA

- A. *Macrocoelia platys* Cooper, new species..... 898  
 (1-5) Side, anterior, posterior, brachial, and pedicle views,  $\times 1$ , of the holotype, 117790a; (6) brachial interior,  $\times 1$ , paratype, 117790c; (7) interior of the pedicle valve,  $\times 1$ , paratype, 117790b.  
 Lincolnshire formation, Marble Bluff, 8 miles west-northwest of Loudon, Loudon (30') Quadrangle, Tenn.
- B. *Glyptomena ? distans* (Raymond)..... 883  
 (8) Exterior of a brachial valve,  $\times 1$ , holotype, Carnegie Mus. 5452.  
 Valcour formation, Valcour Island, Plattsburg (15') Quadrangle, N. Y.
- C. *Macrocoelia magna* (Butts)..... 894  
 (10-13) Respectively side, anterior, brachial, and pedicle views of a large and complete specimen,  $\times 1$ , hypotype, 117781a; (9) pedicle view of a large specimen,  $\times 1$ , hypotype, 117781d; (14) brachial view of a complete uncrushed specimen,  $\times 1$ , hypotype, 117781b.  
 Benbolt formation, roadside, 1.6 miles northeast of Heiskell, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.

## PLATE 232

## MACROCOELIA

- A. *Macrocoelia magna* (Butts)..... 894  
 (1-5) Respectively pedicle, brachial, anterior, posterior, and side views,  $\times 1$ , of the holotype, 98199; (6) posterior of the holotype,  $\times 2$ , showing the interarea and chilidium; (7) ornamentation of the brachial valve,  $\times 2$ , showing cancellated fine costellae.  
 Benbolt formation, 1 mile northwest of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

## PLATE 233

## MACROCOELIA

- A. *Macrocoelia ornata* Cooper, new species..... 897  
 (1-3) Brachial, side, and pedicle views of a small specimen,  $\times 1$ , paratype, 117789a.  
 Little Oak formation, junction of Bailey Gap and main roads,  $1\frac{1}{4}$  miles northeast of Newhope Church, Cahaba Valley, SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 13, T. 19 S., R. 2 W., Vandiver (15') Quadrangle, Ala.

- |  | Page |
|--|------|
| B. <i>Macrocoelia plebeia</i> Cooper, new species.....   | 899  |
| (4) Exterior view, $\times 1$ , of a paratype, 117791; (5, 6) side and exterior views of the pedicle valve, $\times 2$ , of the same specimen.   |      |
| Lenoir formation ( <i>Valcourea</i> bed), small abandoned quarry between the Southern RR. tracks and U. S. Highway 11, 1½ miles southwest of Philadelphia, Philadelphia (T.V.A. 131-NW) Quadrangle, Tenn.  |      |
| C. <i>Macrocoelia elegantula</i> Cooper, new species.....  | 893  |
| (7-10) Respectively posterior, side, brachial, and pedicle views of a damaged specimen, outlines restored, $\times 1$ , paratype, 117776a; (11) posterior of the preceding specimen, $\times 2$ , showing the interareas, chilidium, and extremely short pseudodeltidium; (12) imperfect pedicle interior showing the flabellate muscle scars, $\times 1$ , paratype, 117776b. |      |
| Whistle Creek formation, 1½ miles northwest of Lexington, Lexington (15') Quadrangle, Va.  |      |
| D. <i>Macrocoelia occidentalis</i> Cooper, new species.....  | 896  |
| (13) Exterior of the pedicle valve, $\times 1$ , paratype, 117784.   |      |
| Yellow-weathering limestone on 25-foot sandstone at base of Eureka group, 3 miles north of Martin Ranch, Roberts Mountains (1°) Quadrangle, Nev.   |      |
| (14) Another pedicle exterior, $\times 1$ , paratype, 117785c.   |      |
| Same formation as above, 1.9 miles N. 31° E. of Blair (= Segura) Ranch, Roberts Mountains (1°) Quadrangle, Nev.  |      |
| (15-19) Respectively anterior, pedicle, side, posterior, and brachial views, $\times 1$ , of the holotype, 117787; (20) enlargement, $\times 2$ , of the posterior part of the brachial valve of the holotype, showing ornamentation.  |      |
| Same formation, 2 miles north of Martin Ranch, Roberts Mountains (1°) Quadrangle, Nev.   |      |

## PLATE 234

## MACROCOELIA

- |   |     |
|---|-----|
| A. <i>Macrocoelia rotunda</i> Cooper, new species.....  | 899 |
| (1, 2, 3, 5) Respectively posterior, side, anterior, and pedicle views of the pedicle valve, $\times 1$ , paratype, 98200c; (4) brachial view of a complete specimen, $\times 1$ , holotype, 98200a.                |     |
| Benbolt formation (lower), Green Valley Church, 3 miles southwest of Lebanon, Brumley (T.V.A. 205-SE) Quadrangle, Va.   |     |
| B. <i>Macrocoelia bella</i> Cooper, new species.....  | 891 |
| (6-10) Anterior, brachial, side, posterior, and pedicle views of the holotype, 117766a; (11, 12) brachial and pedicle views of an imperfect specimen showing the ornamentation well, $\times 1$ , paratype, 117764. |     |
| Bromide formation (Mountain Lake member), cut on Oklahoma Highway 18, 1.8 miles south of Sulphur, sec. 11, T. 1 S., R. 3 E., Murray County, Okla.   |     |
| (13) Brachial interior showing ridges and cardinalia, $\times 1$ , paratype, 117765.  |     |
| Bromide formation (Mountain Lake member), 4 miles south of Davis, Murray County, Okla.  |     |

## PLATE 235

## GLYPTOMENA, MACROCOELIA

- |   |     |
|---|-----|
| A. <i>Glyptomena ? prisca</i> (Raymond).....  | 884 |
| (1) Exterior of the brachial valve, $\times 2$ , holotype, Carnegie Mus. 5464.            |     |
| Crown Point formation, Valcour Island, Lake Champlain, Plattsburg (15') Quadrangle, N. Y. |     |

- |  | Page |
|--|------|
| B. <i>Glyptomena</i> sp. 1.....  | 885  |
| (2) Exterior of a pedicle valve, $\times 2$ , figured specimen, 117857a.<br>Ward Cove ? formation, $\frac{1}{2}$ mile south of Rocky Gap, Pocahontas (30') Quad-<br>rangle, Va.  |      |
| C. <i>Macrocoelia elegantula</i> Cooper, new species.....  | 893  |
| (5-9) Respectively anterior, posterior, pedicle, brachial, and side views of a com-<br>plete specimen, $\times 1$ , holotype, 117773.<br>Whistle Creek formation, Whistle Creek, $1\frac{1}{2}$ miles northwest of Lexington,<br>Lexington (15') Quadrangle, Va.   |      |
| (10-14) Respectively anterior, brachial, posterior, pedicle, and side views of a<br>small specimen, $\times 1$ , paratype, 117774a; (16) brachial interior showing ridges<br>and cardinalia, $\times 1$ , paratype, 117774b.<br>Whistle Creek formation (20 feet below the Murat limestone), 1 mile north-<br>west of Lexington, Lexington (15') Quadrangle, Va. |      |
| (15) Brachial interior showing the septa, $\times 1$ , paratype, 117775a.<br>Whistle Creek formation, near Lexington, Lexington (15') Quadrangle, Va.  |      |
| D. <i>Glyptomena</i> ? <i>prisca</i> (Raymond).....  | 884  |
| (3) Plasticine replica of the brachial exterior, $\times 2$ , hypotype, 117854a.<br>Crown Point formation, Appleton Point, near Fort Cassin, Port Henry (15')<br>Quadrangle, Vt.   |      |
| (4) Exterior of a pedicle valve, $\times 2$ , hypotype, 117853.<br>Crown Point formation, Fort Cassin, Port Henry (15') Quadrangle, Vt.  |      |
| E. <i>Macrocoelia</i> cf. <i>M. magna</i> Cooper, new species.....   | 894  |
| (17-21) Respectively anterior, posterior, side, brachial, and pedicle views of a com-<br>plete specimen, $\times 1$ , hypotype, 117780a.<br>Benbolt (30 feet above the base), 100 yards west of the store, junction of<br>Tennessee Highway 33 and the Flint Creek road, Maynardville (T.V.A.<br>145-SE) Quadrangle, Tenn.                                       |      |

## PLATE 236

## MACROCOELIA, ÖPIKINA

- |   |     |
|---|-----|
| A. <i>Macrocoelia ornata</i> Cooper, new species.....   | 897 |
| (1-5) Respectively brachial, posterior, anterior, side, and pedicle views of specimen<br>damaged on the right side, $\times 1$ , holotype, 117789c; (6, 7) pedicle and brachial<br>views of a small specimen, $\times 1$ , paratype, 117788a.<br>Little Oak formation, junction Bailey Gap and main roads, $1\frac{3}{4}$ miles northeast<br>of Newhope Church, Cahaba Valley, SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 19 S., R. 2 W.,<br>Vandiver (15') Quadrangle, Ala. |     |
| B. <i>Macrocoelia duplistriata</i> (Willard).....   | 893 |
| (8-10) Pedicle, side, and brachial views of a young specimen, $\times 1$ , hypotype,<br>117770.<br>Lincolnshire formation (Hogskin member), north of Hayes' house, Evans<br>Ferry section, along U. S. Highway 25E, about 1 mile north of Indian Creek,<br>Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.   |     |
| (11) Pedicle view of a large specimen, $\times 1$ , hypotype, 117767.<br>Lincolnshire formation, $\frac{1}{2}$ mile northwest of Eidson, Kyles Ford (T.V.A.<br>170-SE) Quadrangle, Tenn.  |     |
| (12) Brachial interior of a large individual, $\times 1$ , hypotype, 117771.<br>Lincolnshire formation (Hogskin member), just above <i>Sowerbyites</i> zone,<br>$\frac{1}{2}$ mile east of Beech Grove Church, 3 miles west-southwest of Thorn Hill,<br>Avondale (T.V.A. 162-SW) Quadrangle, Tenn.  |     |

	Page
C. <i>Macrocoelia</i> cf. <i>M. magna</i> (Butts).....	894
(13) Brachial view of a large specimen, $\times 1$ , hypotype, 117779a. Benbolt formation, on Virginia Highway 74, 0.2 mile southwest of New Bethel Church, $\frac{1}{2}$ mile east of junction with U. S. Highway 54, Hilton (T.V.A. 197-NW) Quadrangle, Va.	
D. <i>Öpikina maja</i> Cooper, new species.....	913
(14) Brachial view of a large specimen, $\times 1$ , holotype, 117819. Ridley formation, on U. S. Highway 27, just northwest of Chickamauga Creek, Kensington (T.V.A. 106-SE) Quadrangle, Ga.	

## PLATE 237

## ÖPIKINA

A. <i>Öpikina speciosa</i> Cooper, new species.....	918
(1, 2) Brachial and pedicle views of a large specimen, $\times 1$ , paratype, 117836a. Wardell formation, 0.3 mile southwest of Little Barren Church on old Ten- nessee Highway 33, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.	
(3-7) Respectively anterior, posterior, side, brachial, and pedicle views of a com- plete specimen, $\times 1$ , paratype, 117837a; (8) same specimen as preceding, $\times 1$ , tilted to show unbonal region of pedicle valve; (10, 11) brachial and pedicle views of another complete specimen, $\times 1$ , paratype, 117837b; (14) brachial inter- ior, $\times 1$ , showing ridges, paratype, 117837c. Wardell formation, on Tennessee Highway 33, $\frac{1}{2}$ mile west of the cemetery at the bend below Kecks Mill, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.	
(9) Brachial interior showing the adductor ridges, $\times 1$ , paratype, 123287b. Ridley formation = Wardell, quarry $1\frac{1}{2}$ miles south-southeast of Cove Church, Kensington (T.V.A. 106-SE) Quadrangle, Ga.	
(12) Pedicle interior showing muscle scars, $\times 1$ , paratype, 117834e; (15, 16) re- spectively $\times 1$ and $\times 2$ enlargements of the brachial interior showing ridges, muscle scars, paratype, 117834b; (17) interior of another brachial valve, $\times 1$ , paratype, 117834a. Wardell formation, north quarry on Station Creek, $\frac{1}{4}$ mile south of U. S. Highway 58, 2 miles east of Cumberland Gap, Wheeler (T.V.A. 153-SE) Quad- rangle, Tenn.	
(13) Pedicle interior showing form of muscle area, $\times 1$ , paratype, 117838a. Wardell formation, back of Camp Loyston, Maynardville (30') Quadrangle, Tenn.	
(18, 19) Respectively $\times 1$ and $\times 2$ enlargements of the brachial valve, showing ridges and cardinalia, paratype, 117831b. Pierce formation, Bradleys Creek, 1 mile east of Lascasas, Rutherford County, Tenn.	
B. <i>Öpikina dorsatiformis</i> Cooper, new species.....	905
(20-23) Respectively brachial, anterior, posterior, and side views of a complete specimen, $\times 1$ , holotype, 117801; (24-28) respectively brachial, anterior, poste- rior, side, and pedicle views, $\times 2$ , of the holotype. Edinburg formation (lower part of <i>Nidulites</i> zone), just east of the small ravine beside the road along Tumbling Run, $1\frac{1}{2}$ miles southwest of Strasburg, Strasburg (15') Quadrangle, Va.	



PLATE 238

ÖPIKINA

- A. *Öpikina speciosa* Cooper, new species..... 918  
 (1) Brachial view of a complete specimen,  $\times 1$ , showing wrinkles on the posterior margin of the brachial valve, paratype, 117839b; (2, 3) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior showing the muscle scars, paratype, 117839i; (4) another pedicle interior,  $\times 1$ , paratype, 117839h; (5) brachial interior showing subperipheral rim and septa,  $\times 1$ , paratype, 117839e; (6, 7) respectively  $\times 1$  and  $\times 2$  enlargements of a brachial interior showing cardinalia and pallial marks, paratype, 117839f.  
 Ridley formation = Wardell formation, on U. S. Highway 27, just northwest of Chickamauga Creek, Kensington (T.V.A. 106-SE) Quadrangle, Ga.
- B. *Öpikina gregaria* Cooper, new species..... 911  
 (8, 9) Respectively  $\times 1$  and  $\times 2$  enlargements of the brachial view of a specimen preserving an attenuate cardinal extremity, paratype, 117814a; (10, 11) respectively  $\times 1$  and  $\times 2$  views of another complete individual, paratype, 117814c; (12-15) respectively side, posterior, anterior, and pedicle views of a complete specimen with slightly obtuse cardinal extremities,  $\times 1$ , holotype, 117814b; (16) brachial view of the preceding specimen,  $\times 2$ , showing ornamentation; (17, 18) two brachial interiors showing septa and cardinalia,  $\times 2$ , paratypes, 117814e, 117814d.  
 Bromide formation (Mountain Lake Member), long cut on Oklahoma Highway 99, SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 12, T. 1 N., R. 6 E., 3 miles south of Fittstown, Pontotoc County, Okla.

PLATE 239

MACROCOELIA, ÖPIKINA

- A. *Öpikina glabella* Cooper, new species..... 910  
 (1-5) Respectively posterior, anterior, side, brachial, and pedicle views of a complete specimen,  $\times 1$ , paratype, 123267a; (6, 7) pedicle and brachial views,  $\times 2$ , of the preceding specimen.  
 Upper Arline formation, north side of wagon road in glade,  $\frac{1}{4}$  mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.
- B. *Öpikina septata* Salmon..... 918  
 (8, 9) Brachial and pedicle views of a complete specimen,  $\times 1$ , paratype, 117829a; (22, 23) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior showing the flabellate muscle area indistinctly, paratype, 117829b; (26, 27) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial interior showing septa and cardinalia, holotype, 117829c; (10-13) respectively anterior, side, brachial, and posterior views of a large, complete specimen,  $\times 1$ , hypotype 117827a; (21) enlargement,  $\times 4$ , of the exterior of the pedicle valve of the preceding showing the costellae and fila crossing them; (28) brachial interior showing considerably thickened ridges,  $\times 2$ , hypotype, 117827b.  
 Lebanon formation (upper half), cut on U. S. Highway 41,  $\frac{3}{4}$  mile south of Knox Branch, 9 miles southeast of Murfreesboro, Rutherford County, Tenn.  
 (14-18) Respectively anterior, posterior, brachial, pedicle, and side views of a well-formed specimen,  $\times 1$ , hypotype, 117828; (19, 20) pedicle and brachial views of the preceding hypotype,  $\times 2$ , showing ornamentation and interarea.  
 Lebanon formation (upper half), U. S. Highway 41, 1 $\frac{1}{2}$  miles northwest of Mount Olivet, about 10 miles southeast of Murfreesboro, Rutherford County, Tenn.

- |   | Page |
|---|------|
| (24, 25) Respectively $\times 1$ and $\times 2$ enlargements of a brachial interior showing septa and cardinalia, hypotype, 117830.<br>Lebanon formation ( <i>Doleroides</i> zone), cut on U. S. Highway 70N, opposite Fairview Service Station, $\frac{1}{2}$ mile west of Rome, Smith County, Tenn. |      |
| C. <i>Macrocoelia magna</i> (Butts).....  | 894  |
| (29) Brachial view of a complete specimen, $\times 1$ , hypotype, 117778.<br>Benbolt formation, $\frac{1}{2}$ mile south of Gate City, Gate City (T.V.A. 188-NE) Quadrangle, Va.  |      |

## PLATE 240

## ÖPIKINA

- |   |     |
|---|-----|
| A. <i>Öpikina varia</i> Cooper, new species.....  | 922 |
| (1) Pedicle exterior, $\times 1$ , paratype, 71350a; (7) surface ornamentation of the brachial valve, $\times 4$ , paratype, 71350b.<br>Carters formation, quarry 0.3 mile northeast of Gate City, Leeds (15') Quadrangle, Ala.   |     |
| (2, 3) Respectively $\times 1$ and $\times 2$ enlargements of the brachial side of a complete specimen, holotype, 117848a; (5) brachial interior, $\times 2$ , showing septa and cardinalia, paratype, 117848b.<br>Horizon and locality same as preceding.  |     |
| (4) Pedicle interior showing the form of the muscle scars, $\times 2$ , paratype, 117847a; (6) brachial interior showing pallial marks and cardinalia, $\times 2$ , paratype, 117847c.<br>Dryden formation (30 feet above marble), road along Little Sycamore Creek, $\frac{1}{2}$ mile northeast of the west edge of the Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.  |     |
| B. <i>Öpikina eximia</i> Cooper, new species.....   | 906 |
| (8-11) Respectively pedicle, side, posterior, and anterior views of a complete specimen, $\times 1$ , holotype, 117806a; (12) brachial view of another complete specimen, $\times 1$ , paratype, 117806b.<br>Lebanon formation ( <i>Doleroides</i> zone), cut on U. S. Highway 70N, opposite Fairview Service Station, $\frac{1}{2}$ mile west of Rome, Smith County, Tenn. |     |
| (13) Brachial view of a large individual, $\times 1$ , paratype, 117803; (14) posterior of the preceding specimen, $\times 3$ , showing angular pseudodeltidium.<br>Lebanon formation (upper half), cut on U. S. Highway 41, $\frac{3}{4}$ mile south of Knox Branch, 9 miles southeast of Murfreesboro, Rutherford County, Tenn.   |     |
| (15, 16) Respectively $\times 1$ and $\times 2$ enlargements of the pedicle interior showing details of the muscle scars and pallial marks, paratype, 117805.<br>Lebanon formation (middle), ridge 3 miles east of Murfreesboro, Rutherford County, Tenn.   |     |
| (17) Brachial interior showing thickened subperipheral rim, muscle scars, and cardinalia, $\times 1$ , paratype, 117802.<br>Lebanon formation ( <i>Doleroides</i> zone), east end of the bridge over Round Lick Creek on U. S. Highway 70N at Rome, Smith County, Tenn.   |     |
| (18) Pedicle interior showing flabellate muscle area, $\times 1$ , paratype, 117804a.<br>Lebanon formation (lower), Columbia, Maury County, Tenn.   |     |

## PLATE 241

## ÖPIKINA

- |   |     |
|---|-----|
| A. <i>Öpikina expatiata</i> Cooper, new species.....                                  | 907 |
| (1-5) Respectively posterior, anterior, side, pedicle, and brachial views of a large, |     |

	Page
complete specimen, $\times 1$ , holotype, 117807a; (6, 7) brachial and pedicle views of a specimen smaller than the preceding, $\times 1$ , paratype, 117807b; (8) brachial interior showing the ridges and cardinalia, $\times 1$ , paratype, 117807c.	
Bromide formation (Mountain Lake member), cut on Oklahoma Highway 18, NW $\frac{1}{4}$ sec. 11, T. 1 S., R. 3 E., 1.8 miles south of Sulphur, Murray County, Okla.	
B. <i>Öpikina quadrata</i> Cooper, new species.....	917
(10) Pedicle interior, $\times 1$ , paratype, 117826b; (9) pedicle exterior, $\times 1$ , paratype, 117826d; (11) brachial exterior, $\times 1$ , holotype, 117826e; (12) brachial interior, $\times 1$ , paratype, 117826f; (13) posterior view of the preceding specimen, $\times 2$ , showing the cardinal process.	
Ridley formation (top), east side of Marshall Knobs, 5 miles south of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.	
C. <i>Öpikina subplanodorsata</i> Cooper, new species.....	920
(14-18) Respectively anterior, posterior, side, brachial, and pedicle views of a complete specimen, $\times 1$ , holotype, 117840a; (19) pedicle interior showing muscle scars, $\times 1$ , paratype, 117840b.	
Wardell formation, hill west of the west fork of the center branch of Notchy Creek, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.	
D. <i>Öpikina speciosa</i> Cooper, new species.....	918
(20-24) Respectively pedicle, posterior, anterior, side, and brachial views of a complete specimen, $\times 1$ , paratype, 117833a; (25, 26) respectively $\times 1$ and $\times 2$ views of a pedicle valve showing ornamentation, paratype, 117833d; (27, 28) respectively $\times 1$ and $\times 2$ enlargements of the brachial interior, showing cardinalia and ridges, paratype, 117833c.	
Ridley formation (lower third), east side of Marshall Knobs, 5 miles south of Murfreesboro, Rutherford County, Tenn.	
PLATE 242	
ÖPIKINA	
A. <i>Öpikina</i> sp. 1.....	924
(1-5) Respectively pedicle, anterior, posterior, side, and brachial views of a complete specimen, $\times 2$ , figured specimen, 117849.	
Benbolt formation (upper), east bank of a sinkhole south of Lakeview Church, Virginia Highway 71, southeast $\frac{1}{4}$ of the east central subquad., Moll Creek (T.V.A. 196-SE) Quadrangle, Va.	
B. <i>Öpikina dorsatiformis</i> Cooper, new species.....	905
(6) Exterior of the pedicle valve, $\times 1$ , paratype, 117800; (7-10) respectively anterior, posterior, normal, and side views, $\times 2$ , of the preceding specimen.	
Edinburg formation ( <i>Cyrtototella</i> zone), ravine at the switch about $\frac{1}{2}$ mile east of Strasburg Junction, Strasburg (15') Quadrangle, Va.	
C. <i>Öpikina nasuta</i> Cooper, new species.....	914
(11, 12) Exterior and interior of a brachial valve, $\times 2$ , paratype, 117821a; (13, 13a) exterior and side view of the pedicle valve, $\times 1$ , showing narrow anterior, holotype, 117821e.	
Chatham Hill formation, 1.2 miles S. 31° E. of Sharon Springs, Burkes Garden (15') Quadrangle, Va.	
D. <i>Öpikina bellula</i> Cooper, new species.....	904
(14-16) Anterior, pedicle, and side views of a pedicle valve, $\times 1$ , holotype, 117799a; (18) exterior of the preceding pedicle valve, $\times 2$ , showing the ornamentation; (17, 21) posterior and exterior views of another pedicle valve, $\times 1$ , paratype, 117799b; (22) pedicle view of the preceding specimen, $\times 2$ , showing	

ornamentation; (19, 20) respectively  $\times 1$  and  $\times 2$  enlargements of a pedicle exterior showing wrinkles on the posterior margin, paratype, 117799c; (23, 24) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial interior, paratype, 117799d; (25) another brachial interior showing obscure ridges, the muscle scars, and cardinalia,  $\times 2$ , paratype, 117799e.

Horizon and locality same as B above.

## PLATE 243

## ÖPIKINA

- A. *Öpikina extensa* Cooper, new species..... 908  
 (1-4, 7) Respectively pedicle, brachial, anterior, side, and posterior views of an alate form,  $\times 1$ , holotype, 123268b; (5, 6) pedicle and brachial views of another specimen with outlines restored,  $\times 1$ , paratype, 123268a; (8) ornamentation of the pedicle valve,  $\times 4$ , of the preceding specimen.  
 Bromide formation (Pooleville member), 3 miles northeast of Springer, Carter County, Okla.
- B. *Öpikina formosa* Cooper, new species..... 909  
 (9-13) Respectively pedicle, brachial, posterior, anterior, and side views of a small but complete specimen,  $\times 1$ , paratype, 123270a; (14, 15) pedicle and brachial views of a larger specimen,  $\times 1$ , paratype, 123271a; (16, 17) brachial and pedicle views of a specimen larger than the preceding two,  $\times 1$ , paratype, 123269b.  
 Bromide formation (Pooleville member—*Oxoplectia gouldi* zone), Spring Creek, N $\frac{1}{2}$  sec. 17, T. 2 S., R. 1 W., Murray County, Okla.
- C. *Öpikina formosa* Cooper, new species..... 909  
 (18-22) Respectively posterior, anterior, side, pedicle, and brachial views of a nearly perfect specimen,  $\times 1$ , holotype, 123272a; (28) brachial valve,  $\times 2$ , of the holotype; (27) part of the ornamentation of the pedicle valve,  $\times 4$ , near the beak of the holotype; (23) interior of the brachial valve showing thickened subperipheral rim and cardinalia,  $\times 2$ , paratype, 123272b.  
 Bromide formation (Pooleville member—*Oxoplectia gouldi* zone), branch of Hickory Creek, NW $\frac{1}{4}$  sec. 26, T. 5 S., R. 1 E., Carter County, Okla.  
 (24) Interior of the brachial valve showing septal ridges,  $\times 1$ , paratype, 117808; (25, 26) posterior and interior views of the same brachial valve showing the cardinal process and septal ridges,  $\times 2$ . Note accessory tooth in socket.  
 Bromide formation (Pooleville member—*Oxoplectia gouldi* zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Carter County, Okla.

## PLATE 244

## ÖPIKINA

- A. *Öpikina parvula* Cooper, new species..... 915  
 (1-3, 5) Respectively side, posterior, pedicle, and anterior views of a complete specimen,  $\times 1$ , holotype, 117823a; (6-8) brachial, side, and pedicle views,  $\times 2$ , of the preceding specimen.  
 Benbolt formation, 5 miles northwest of Wytheville, Wythe County, Va.  
 (4, 9) Respectively  $\times 1$  and  $\times 2$  enlargements of the brachial view of another complete specimen, paratype, 117822a.  
 Benbolt formation, Green Valley Church, 3 miles southwest of Lebanon, Brumley (T.V.A. 205-SE) Quadrangle, Va.
- B. *Öpikina pulchella* Cooper, new species..... 916  
 (10-13) Respectively posterior, side, brachial, and anterior views,  $\times 1$ , of the holo-

- Page
- type, 117825a; (14-16) pedicle, side, and brachial views,  $\times 2$ , of the holotype.  
 Benbolt formation (base), 0.2 mile south of the middle fork of Moccasin Creek, 1½ miles due south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.
- C. *Öpikina transversa* Cooper, new species..... 921  
 (17-21) Respectively posterior, pedicle, brachial, anterior, and side views of a complete specimen,  $\times 1$ , holotype, 117844a; (22) pedicle view of a complete specimen showing posterolateral wrinkles,  $\times 1$ , paratype, 98226a; (27) brachial view of a complete specimen,  $\times 2$ , paratype, 98226b; (28) enlargement of part of the brachial valve,  $\times 4$ , of the preceding specimen; (29) pedicle exterior,  $\times 2$ , paratype, 117843d.  
 Wardell formation, Lloyd Carter's barn, 0.8 mile by road northeast of Rye Cove School, Clinchport (T.V.A. 188-NW) Quadrangle, Va.  
 (23) Pedicle view of a young and wide specimen,  $\times 1$ , paratype, 117846a; (24) brachial view of an individual without alate points,  $\times 1$ , paratype, 117846c; (25, 26) pedicle and brachial views of a young specimen showing the ornamentation,  $\times 2$ , paratype, 117846b; (30) brachial interior showing thickened rim, and cardinalia,  $\times 2$ , paratype, 117846d; (31, 32) posterior half and posterior view of the preceding brachial interior showing the cardinal process in detail and the socket tooth well developed,  $\times 4$ , paratype, 123276a.  
 Wardell formation, second road cut west of L. McDavid's house, 1 mile west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- PLATE 245  
 GLYPTOMENA, ÖPIKINA
- A. *Glyptomena parvula* Cooper, new species..... 883  
 (1) Exterior of a pedicle valve,  $\times 1$ , paratype, 117855g; (2, 4) exterior and interior of the preceding specimen,  $\times 2$ , showing the muscle scars; (3) exterior of an imperfect brachial valve showing the ornamentation,  $\times 2$ , paratype, 117855h; (5, 6) respectively  $\times 2$  and  $\times 1$  enlargements of a brachial interior, showing the septal ridges and cardinalia, holotype, 117855e; (7, 8) respectively  $\times 2$  and  $\times 1$  enlargements of the brachial interior, showing cardinalia, paratype, 117855f.  
 Effna-Rich Valley formations, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- B. *Öpikina inquassa* (Sardeson)..... 912  
 (9-12) Respectively posterior, anterior, side, and brachial views of a complete specimen,  $\times 1$ , hypotype, 24206.  
 Decorah formation (Guttenberg member—*Stictopora* bed), Minneapolis, Minn.
- C. *Öpikina matutina* Cooper, new species..... 913  
 (13-17) Respectively anterior, posterior, pedicle, brachial, and side views of a complete specimen,  $\times 1$ , holotype, 117817a; (18, 19) pedicle and brachial views,  $\times 2$ , of the holotype; (20) pedicle interior showing muscle area,  $\times 2$ , paratype, 117817b.  
 Arline formation, locality same as A above.
- D. *Öpikina minnesotensis* (N. H. Winchell)..... 914  
 (21) Exterior of the pedicle valve showing ornamentation,  $\times 2$ , hypotype, 45277a; (22) exterior of the pedicle valve showing wrinkles along posterior margin,  $\times 2$ , hypotype, 45277c; (25) interior of the brachial valve,  $\times 2$ , showing muscle scars, hypotype, 45277b.  
 Platteville formation (McGregor member), Minneapolis, Minn.  
 (23, 24) Respectively  $\times 1$  and  $\times 2$  enlargements of a pedicle interior showing the muscle scars, hypotype, 24708a; (27, 28) respectively  $\times 1$  and  $\times 2$  enlarge-

ments of a brachial interior, showing rim, septal ridges, and cardinalia, hypotype, 24708b.

Platteville formation (McGregor member), Rocktown, Wis.

(26) Brachial interior showing septal ridges,  $\times 2$ , hypotype, 24705.

Platteville formation, Ripon Center, Wis.

PLATE 246

GLYPTOMENA, ÖPIKINA, PIONOMENA

- A. *Glyptomena* ? *bella* Cooper, new species..... 882  
 (1) Plasticine replica of the brachial exterior,  $\times 1$ , paratype, 117852b; (2) exterior of the pedicle valve,  $\times 1$ , holotype, 117852a.  
 Murat formation, along the road and ridge 2 miles northwest of Lexington, vicinity of Whistle Creek, Lexington (15') Quadrangle, Va.
- B. *Öpikina pulchella* Cooper, new species..... 916  
 (3, 4) Impression of the pedicle interior and anterior view of same showing muscle scars and pallial marks,  $\times 2$ , paratype, 117825b.  
 Benbolt formation (base), 0.2 mile south of middle fork of Moccasin Creek, 1½ miles due south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.
- C. *Öpikina alata* Cooper, new species..... 903  
 (5) Interior of the brachial valve,  $\times 2$ , showing septa and cardinalia, paratype, 117797b; (6) brachial view,  $\times 1$ , of the holotype, 117797c; (7-11) respectively anterior, side, pedicle, posterior, and brachial views,  $\times 2$ , of the holotype.  
 Edinburg formation (lower part *Nidulites* zone), 100 yards south of entrance to Battlefield Crystal Caverns, on U. S. Highway 11, 1 mile north of Strasburg, Strasburg (15') Quadrangle, Va.
- D. *Öpikina dubia* Cooper, new species..... 906  
 (12) Exterior of the brachial valve,  $\times 2$ , paratype, 123273a.  
 Botetourt formation (bed 3), near Cedar Grove Church and School, 1½ miles southeast of Harrisonburg, Harrisonburg (15') Quadrangle, Va.  
 (13) Exterior of the pedicle valve,  $\times 2$ , holotype, 123274a; (14) ornamentation,  $\times 4$ , of the preceding specimen.  
 Botetourt formation, 1 mile northwest of Lexington, Lexington (15') Quadrangle, Va.
- E. *Pionomena* ? *dubia* Cooper, new species..... 901  
 (15) Exterior of the pedicle valve,  $\times 1\frac{1}{2}$ , holotype, 98222.  
 Effna formation, Porterfield Quarry, 5 miles east of Saltville, Maccrady (T.V.A. 218-NW) Quadrangle, Va.
- F. *Glyptomena sculpturata* Cooper, new species..... 885  
 (16, 17) Exterior and interior of the pedicle valve, showing ornamentation and delthyrial cavity,  $\times 2$ , paratype, 117856a; (18, 23) pedicle and brachial views of a complete specimen,  $\times 2$ , holotype, 117856c; (19, 20) exterior and interior of a brachial valve showing ornamentation and cardinalia,  $\times 2$ , paratype, 117856b; (21, 22) interior and exterior of another brachial valve,  $\times 2$ , showing cardinalia, paratype, 117856d.  
 Chatham Hill formation, 1.2 miles S. 31° E. of Sharon Springs, Burkes Garden (15') Quadrangle, Va.

PLATE 247

MACROCOELIA, ÖPIKINA, RAFINESQUINA

- A. *Öpikina* ? *planulata* Cooper, new species..... 916  
 (1) Interior of the brachial valve,  $\times 1$ , paratype, 117824d; (2) exterior of the

	Page
pedicle valve, $\times 1$ , holotype, 117824a; (3) interior of the pedicle valve, $\times 1$ , paratype, 117824c; (4) exterior of the brachial valve, $\times 1$ , paratype, 117824b.	
Pierce formation, Pierce Mill, on Tennessee Highway 10, just south of Walterhill, $7\frac{1}{2}$ miles north-northeast of Murfreesboro, Rutherford County, Tenn.	
B. <i>Rafinesquina</i> cf. <i>R. trentonensis</i> (Conrad).....	888
(5, 6) Exterior of two pedicle valves, $\times 1$ , figured specimens, 97578a, 97578b.	
Collierstown formation, $\frac{3}{4}$ mile northeast of Collierstown, Rockbridge County, Va.	
C. <i>Öpikina glabella</i> Cooper, new species.....	910
(7-10) Respectively anterior, side, pedicle, and brachial views, $\times 1$ , of the holotype, 123267b.	
Arline formation (upper), north side of old road in glade, $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
D. <i>Macrocoelia elegantula</i> Cooper, new species.....	893
(11-13) Respectively pedicle, side, and brachial views of a nearly perfect individual, $\times 1$ , paratype, 117772.	
Whistle Creek formation, on U. S. Highway 60, 100 yards southeast of Whistle Creek, 2 miles northwest of Lexington, Lexington (15') Quadrangle, Va.	
E. <i>Öpikina speciosa</i> Cooper, new species.....	918
(14-16) Respectively brachial, side, and pedicle views of a large and complete specimen, $\times 1$ , paratype, 117833e.	
Ridley formation (lower third), east side of Marshall Knobs, 5 miles south of Murfreesboro, Rutherford County, Tenn.	
F. <i>Öpikina lirata</i> Cooper, new species.....	912
(17-20) Respectively anterior, posterior, side, and pedicle views of a complete specimen, $\times 1$ , holotype, 117816d; (21, 23) brachial and pedicle views of a complete specimen, $\times 1$ , paratype, 117816b; (22) brachial view of a large specimen, $\times 1$ , paratype, 117816a; (24) interior of the brachial valve showing thickened anterior margin, $\times 1$ , paratype, 117816c; (25) fragmentary brachial valve, $\times 2$ , showing cardinalia and adductor ridges, paratype, 117816f.	
Decorah formation (Ion member), 1.1 miles east of U. S. Highway 52, south edge of Cannon Falls, Goodhue County, Minn.	

## PLATE 248

## PIONOMENA, RHIPIDOMENA, STROPHOMENA

A. <i>Strophomena canadensis</i> Wilson.....	932
(1) Brachial view, $\times 1$ , of the holotype, G.S.C. 6220.	
Pamelia formation, first terrace above house on road, MacLaren Landing, 22 miles west of Ottawa, Ontario, Canada.	
B. <i>Rhipidomena</i> sp. 1.....	873
(2) Imperfect brachial exterior, $\times 1$ , figured specimen, 117698; (3) ornamentation, $\times 2$ , of the preceding specimen.	
Arline formation, north side of wagon road in glade, $\frac{1}{4}$ mile southeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn.	
C. <i>Pionomena pulchra</i> Cooper, new species.....	903
(4, 7) Respectively $\times 1$ and $\times 2$ enlargements of a small slab with numerous individuals, $\times 1$ , paratype, 123275c; (5) another small slab showing a brachial exterior, $\times 2$ , holotype, 123275b; (6) pedicle exterior, $\times 2$ , from part of 123275c.	
Carlím formation (base) = Grazier member of Hatter formation, Elk Run, 3 miles southwest of Nealmont, Tyrone (15') Quadrangle, Pa.	

## PLATE 249

## MACROCOELIA, ÖPIKINA, RHIPIDOMENA

- |   | Page |
|---|------|
| A. <i>Öpikina speciosa</i> Cooper, new species.....   | 918  |
| (1-5) Respectively anterior, posterior, brachial, side, and pedicle views of a complete specimen, $\times 1$ , holotype, 117835a; (6, 7) respectively $\times 1$ and $\times 2$ enlargements of the pedicle interior showing the muscle area, paratype, 117835d; (8, 9) respectively $\times 1$ and $\times 2$ enlargements of the brachial interior showing septal ridges and cardinalia, paratype, 117835b. |      |
| Ridley formation ( <i>Hesperorthis</i> zone), on Tennessee Highway 28, 0.6 mile south of Chappel Hill Methodist Church, 1 mile south of junction of Tennessee Highways 8 and 28, Sequatchie Valley, Sequatchie County, Daus (T.V.A. 104-SE) Quadrangle, Tenn.   |      |
| B. <i>Macrocoelia duplistriata</i> (Willard).....   | 893  |
| (10-12) Brachial, posterior, and pedicle views of a complete but young specimen, $\times 1$ , hypotype, 117769.   |      |
| Lincolnshire formation (upper), 0.75 mile southwest of Mount Eager Church, 0.2 mile north-northwest of the road, Hogskin Valley, Powder Springs (T.V.A. 154-SE) Quadrangle, Tenn.   |      |
| C. <i>Rhipidomena mesleri</i> Cooper, new species.....  | 868  |
| (13) Pedicle view of a small but complete specimen, $\times 1$ , paratype, 117676; (14-17) respectively brachial, anterior, side, and pedicle views of a large specimen, $\times 1$ , paratype, 117675a.  |      |
| Lincolnshire formation (Hogskin member), Sally Cleveland Farm, $\frac{3}{4}$ mile southwest of Washburn, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.   |      |

## PLATE 250

## RHIPIDOMENA

- |  |     |
|--|-----|
| A. <i>Rhipidomena mesleri</i> Cooper, new species.....   | 868 |
| (1, 2) Respectively $\times 1$ and $\times 2$ enlargements of the pedicle interior showing the broadly flabellate muscle scars, paratype, 117678g; (3, 5) brachial and pedicle views of a complete specimen, $\times 1$ , paratype, 117678a; (6) pedicle view of the preceding specimen, $\times 2$ , showing the ornamentation; (10) enlargement of preceding, $\times 4$ , to show ornamentation in greater detail; (4, 7) respectively $\times 1$ and $\times 2$ views of the interior of a pedicle valve showing muscles and anterior subperipheral rim, paratype, 117678c; (8, 12, 13, 14) respectively brachial, posterior, side, and anterior views of a large and complete specimen, $\times 1$ , holotype, 117678b; (11) enlargement $\times 2$ , of the preceding; (9) interior of a large brachial valve showing cardinalia and muscle scars, $\times 2$ , paratype, 117678f. |     |
| Lincolnshire formation (Hogskin member), north of Hayes' house, Evans Ferry section, along U. S. Highway 25E, 1 mile north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.   |     |

## PLATE 251

## RHIPIDOMENA

- |  |     |
|--|-----|
| A. <i>Rhipidomena subparallela</i> Cooper, new species.....  | 870 |
| (1-5) Respectively posterior, anterior, side, pedicle, and brachial views of a complete specimen, $\times 1$ , holotype, 117679; (6, 7) pedicle and brachial views of a small specimen, $\times 1$ , paratype, 117680a; (8-10) side, pedicle, and brachial views of another complete specimen, $\times 1$ , paratype, 117681a; (11, 12) pedicle and brachial views of a complete specimen, $\times 1$ , paratype, 117681b. |     |



	Page
Elway formation, road cut and quarry on U. S. Highway 25W, 4.7 miles south of Clinton, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.	
B. <i>Rhipidomena tenuitesta</i> (Willard).....	872
(13) Brachial view of a large imperfect specimen with outlines restored, $\times 1$ , hypotype, 117697b; (14) side view, $\times 1$ , of the preceding specimen; (15) exterior of a large pedicle valve, $\times 1$ , hypotype, 117697a; (16) apex of the preceding enlarged, $\times 4$ , to show the minute foramen; (17) pedicle interior showing the flabellate muscle area, $\times 1$ , hypotype, 117695c.	
Lincolnshire formation (Hogskin member), Lee Valley, Lee Valley (T.V.A. 171-NW) Quadrangle, Tenn.	
C. <i>Rhipidomena tenuitesta</i> (Willard).....	872
(18) Pedicle view of a large individual, $\times 1$ , hypotype, 117696.	
Lincolnshire formation, $\frac{1}{2}$ mile north of Eidson, Kyles Ford (T.V.A. 170-SE) Quadrangle, Tenn.	

## PLATE 252

## RHIPIDOMENA

A. <i>Rhipidomena tennesseensis</i> (Willard).....	870
(1-5) Respectively pedicle, posterior, side, brachial, and anterior views of a complete, full-grown specimen, $\times 1$ , hypotype, 117683a.	
Benbolt formation, $\frac{1}{2}$ mile southeast of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.	
B. <i>Rhipidomena tennesseensis</i> (Willard).....	870
(6) Pedicle view of a large complete specimen, $\times 1$ , hypotype, 117685.	
Benbolt formation, 0.2 mile southwest of New Bethel Church, $\frac{1}{2}$ mile east of the junction of Virginia Highway 74 and U. S. Highway 54, Hilton (T.V.A. 197-NW) Quadrangle, Va.	
(7-10) Respectively anterior, posterior, side, and pedicle views of a large, complete specimen, $\times 1$ , hypotype, 117694a; (13) pedicle interior showing the broadly flabellate muscle area and pseudodeltidium, $\times 1$ , hypotype, 117694b.	
Benbolt formation, road cut 1.6 miles northeast of Heiskell, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.	
(11, 12) Pedicle and brachial views of a young specimen, $\times 1$ , hypotype, 117691a.	
Benbolt formation (upper), 0.1 to 0.2 mile north of the road, 1.1 miles north-east of Lee Valley, Lee Valley (T.V.A. 171-NW) Quadrangle, Tenn.	
(14) Brachial interior of a young individual, $\times 1$ , hypotype, 117692a.	
Benbolt formation, $\frac{3}{4}$ mile southwest of Mount Eager Church, Hogskin Valley, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.	

## PLATE 253

## RHIPIDOMENA

A. <i>Rhipidomena tennesseensis</i> (Willard).....	870
(1-5) Respectively brachial, anterior, pedicle, side, and posterior views of a young parallel-sided specimen, $\times 1$ , hypotype, 117684a.	
Benbolt formation, Brick Church, $1\frac{1}{2}$ miles west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.	
(6, 7) Brachial and side views of a complete specimen, $\times 1$ , hypotype, 117682a.	
Benbolt formation, 1 mile southeast of Hansonville, Brumley (T.V.A. 205-SE) Quadrangle, Va.	

- (8) Pedicle exterior,  $\times 1$ , hypotype, 117686.  
Benbolt formation, Virginia Highway 71, between Mason's store and Dickensonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.
- (9) Pedicle exterior showing elongate pedicle foramen,  $\times 1$ , hypotype, 117687;  
(10) foramen, enlarged  $\times 4$ , of the preceding; (11) ornamentation of preceding specimen,  $\times 4$ , view taken slightly southeast of center.  
Benbolt formation,  $\frac{1}{4}$  mile south of church, Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- (12, 13) Respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior showing the form of the muscle area and the individual scars, hypotype, 117688.  
Benbolt formation, road along Little Sycamore Creek,  $\frac{1}{2}$  mile northeast of the west edge of the Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.
- (14) Brachial interior showing septal ridges and cardinalia,  $\times 2$ , hypotype, 117692a. (See pl. 252, B, fig. 14, for the natural size view.)  
Benbolt formation,  $\frac{3}{4}$  mile southwest of Mount Eager Church, Hogskin Valley, Powder Springs (T.V.A. 154-SW) Quadrangle, Tenn.

## PLATE 254

## RHIPIDOMENA, STROPHOMENA

- A. *Rhipidomena mesleri* Cooper, new species..... 868  
(1) Enlargement of the pedicle valve,  $\times 4$ , showing ornamentation, paratype, 117677; (2, 3) side and pedicle views,  $\times 1$ , of a complete specimen from which fig. 1 was prepared.  
Lincolnshire formation (Hogskin member) Beaver Creek, Maynardville (30') Quadrangle, Tenn.
- B. *Rhipidomena flicostellata* Cooper, new species..... 867  
(4) Enlargement of the brachial exterior,  $\times 4$ , of the holotype; (5) brachial view of a complete specimen,  $\times 1$ , holotype, 117671a; (6) posterior part of a pedicle interior showing the muscle scars,  $\times 2$ , paratype, 117671b.  
Sevier formation, 1 mile by road northwest of Big Springs, Binfield (T.V.A. 139-NE) Quadrangle, Tenn.
- C. *Strophomena platyumbona* Cooper, new species..... 945  
(7) Exterior of the pedicle valve,  $\times 1$ , holotype, 117743a; (10) enlargement of the preceding,  $\times 4$ , showing the ornamentation; (8) slab with another pedicle exterior and the brachial interior showing the cardinalia,  $\times 1$ , paratypes, 117743b, c; (9) pedicle interior,  $\times 1$ , showing the form of the muscle area, paratype, 117743d.  
Carters formation (*Oxoplecia* bed), quarry 0.3 mile north of Gate City, Leeds (15') Quadrangle, Ala.

## PLATE 255

## STROPHOMENA

- A. *Strophomena costellata* Cooper, new species..... 933  
(1-3) Brachial, side, and pedicle views of a large, complete specimen,  $\times 1$ , holotype, 117714a; (4, 9) respectively  $\times 1$  and  $\times 2$  of the brachial side of a complete specimen, paratype, 117714b; (5, 8) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle side of the preceding specimen; (18) enlargement of the ornamentation of the preceding specimen,  $\times 4$ , showing closely spaced fila; (6, 7) brachial and pedicle views of a young individual,  $\times 1$ , paratype, 117714c; (10, 11) respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle interior showing the muscle area and pseudodeltidium, paratype, 117714d; (14, 15) interior and posterior views of a fragmentary brachial valve,  $\times 4$ , showing cardinalia,

paratype, 117708; (16, 17) pedicle and brachial views of a very young specimen,  $\times 6$ , showing pedicle siphon, paratype, 123278; (19) interior of an old pedicle valve showing muscle scars, thick ridge surrounding muscle area, and subperipheral rim,  $\times 1$ , paratype, 117713.

Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.

(12) Interior of an imperfect brachial valve showing cardinalia,  $\times 1$ , paratype, 117712; (13) enlargement of the posterior of the preceding specimen,  $\times 2$ , showing cardinalia.

Bromide formation (Pooleville member—upper 20 feet above *Oxoplecia gouldi* zone), same locality as preceding.

## PLATE 256

## STROPHOMENA

- A. *Strophomena basilicoidea* Cooper, new species..... 931  
 (1-4) Respectively pedicle, side, posterior, and brachial views of a complete specimen,  $\times 1$ , holotype, 117706; (5) posterior portion of the brachial view,  $\times 2$ , showing pseudodeltidium and chlidium, same specimen as preceding.  
 Peery formation, cut on U. S. Highway 19, 400 feet west of the junction with Virginia Highway 650, Wittens Mills, Burkes Garden (15') Quadrangle, Va.
- B. *Strophomena fasciculata* Cooper, new species..... 936  
 (6) Brachial view of a small individual,  $\times 2$ , paratype, 117754b; (7) brachial view of a large specimen,  $\times 2$ , holotype, 117754a.  
 Peery formation, 7 miles southwest of Clinton, Clinton (T.V.A. 137-SW) Quadrangle, Tenn.
- C. *Strophomena grandimusculosa* Cooper, new species..... 937  
 (8) Exterior of the pedicle valve,  $\times 1$ , paratype, 117722; (14) ornamentation of preceding specimen,  $\times 4$ , taken southwest of beak.  
 Lebanon formation (*Doleroides* zone), cut on Tennessee Highway 16, 5.1 miles north-northwest of Shelbyville, Bedford County, Tenn.  
 (9, 10) Side and brachial views of a complete specimen,  $\times 1$ , holotype, 117721a; (11) interarea of the preceding,  $\times 2$ , specimen showing carinate pseudodeltidium; (16) pedicle interior showing muscle area and thickened rim around it,  $\times 1$ , paratype, 117721b.  
 Lebanon formation (*Doleroides* zone), cut on U. S. Highway 41,  $\frac{3}{4}$  mile south of Knox Branch, 9 miles southeast of Murfreesboro, Rutherford County, Tenn.  
 (12, 13) Respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle exterior showing ornamentation and pedicle foramen, paratype, 117724a; (17) brachial interior showing cardinalia and muscle scars,  $\times 1$ , paratype, 117724b.  
 Lebanon formation (*Doleroides* zone), cut on U. S. Highway 70S, 1.65 miles west of Cripple Creek, 1.5 miles west of Kittrell, Rutherford County, Tenn.  
 (15) Interior of an old pedicle valve showing exaggerated muscle area,  $\times 1$ , paratype, 117720a.  
 Lebanon formation (*Doleroides* zone), on U. S. Highway 41,  $1\frac{1}{2}$  miles north-west of Mount Olivet, 10 miles southeast of Murfreesboro, Rutherford County, Tenn.

## PLATE 257

## STROPHOMENA

- A. *Strophomena auburnensis* Fenton..... 928  
 (1) Brachial view of an imperfect complete specimen,  $\times 1$ , hypotype, 117704a;

- Page
- (2) pedicle interior,  $\times 1$ , showing muscle area and thick ridge surrounding it, hypotype, 117704b.
- Auburn chert,  $\frac{1}{2}$  mile east of Auburn, Elsberry (15') Quadrangle, Mo.
- B. *Strophomena auburnensis nasuta* Cooper, new subspecies..... 929
- (3-6) Respectively posterior, pedicle, brachial, and side views of a complete specimen,  $\times 1$ , holotype, 45507a; (7) enlargement of the ornamentation of the preceding specimen,  $\times 4$ , left side of brachial valve; (9) pedicle interior, showing thick rim around muscle area,  $\times 1$ , paratype, 45507b; (10) another pedicle interior,  $\times 1$ , paratype, 87091.
- Tyrone formation, High Bridge, Harrodsburg (30') Quadrangle, Ky.
- (8, 11) Exterior and interior of a pedicle valve,  $\times 1$ , hypotype, 117703a; (12) region of the muscle area,  $\times 2$ , of the preceding specimen.
- Carters formation, F. B. Cooper Farm, 2 miles southeast of Pikeville, Pikeville Special (15') Quadrangle, Tenn.
- C. *Strophomena* sp. I..... 947
- (13, 14) Exterior and interior of a brachial valve,  $\times 1$ , figured specimen, 117742a; (15) interior of the preceding brachial valve,  $\times 2$ , showing cardinalia.
- Just beneath the hard sandstone of the Eureka quartzite, west side of the Antelope Range about 3 miles south of Ninemile Canyon, Roberts Mountains (1°) Quadrangle, Nev.

## PLATE 258

## STROPHOMENA

- A. *Strophomena basilica* Cooper, new species..... 930
- (2, 3) Side and brachial views of a small but complete specimen,  $\times 1$ , paratype, 117705g; (4, 5) brachial and pedicle views of a large complete specimen,  $\times 1$ , holotype, 117705a; (1, 6) pedicle interior showing form of muscle area,  $\times 1$ , paratype, 117705c; (7) another pedicle interior,  $\times 1$ , paratype, 117705e; (8, 9) respectively  $\times 1$  and  $\times 2$  enlargements of a large pedicle interior showing muscle scars and pseudodeltidium, paratype, 117705h; (10, 11) exterior and interior views of a large brachial valve,  $\times 1$ , paratype, 117705b; (12) cardinalia,  $\times 2$ , of the preceding specimen; (13) posterior of the preceding specimen,  $\times 2$ , showing lateral profile and cardinal process; (15, 16) interior and exterior of another brachial valve,  $\times 1$ , paratype, 117705d; (17) exterior of the preceding,  $\times 2$ , showing ornamentation; (14) cardinalia,  $\times 2$ , of the preceding specimen.
- Ridley formation (lower third), east side of Marshall Knobs, 5 miles south of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.

## PLATE 259

## STROPHOMENA

- A. *Strophomena medialis* Butts..... 940
- (1, 2) Pedicle and brachial views of a large specimen,  $\times 1$ , lectotype, 98201a; (4-8) respectively posterior, anterior, brachial, pedicle, and side views,  $\times 1$ , of the hypotype, 117730a; (9) posterior half of the preceding,  $\times 2$ , showing interareas and carinate pseudodeltidium; (10) ornamentation of the same specimen,  $\times 4$ , part of pedicle valve; (13) pedicle interior showing the muscle area,  $\times 1$ , hypotype, 117730b.
- Wardell formation, Lloyd Carter's barn, 0.8 mile by road northeast of school at Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.
- (11) Interior of the pedicle valve,  $\times 1$ , showing the muscle scars and pseudo-

deltidium, hypotype, 117734a; (12) posterior of the preceding specimen,  $\times 2$ , showing the details of the muscle area.

Wardell formation, north side of the road 1.1 miles northeast of Lee Valley, Lee Valley (T.V.A. 171-NW) Quadrangle, Tenn.

- (3) Brachial exterior of a complete specimen,  $\times 1$ , hypotype, 117732a.

Wardell formation (lower sponge horizon), behind the Brick Church west of Rye Cove, Clinchport (T.V.A. 188-NW) Quadrangle, Va.

- (14) Pedicle interior showing ridges bounding posterior parts of muscle field,  $\times 1$ , hypotype, 117737a.

Wardell formation, bend of railroad just west of Liberty Hill, Dutch Valley (T.V.A. 154-SE) Quadrangle, Tenn.

- (15) Brachial interior,  $\times 1$ , hypotype, 117733a; (16) cardinalia,  $\times 2$ , of the previous specimen.

Wardell formation, section on U. S. Highway 25E, Thorn Hill, Avondale (T.V.A. 162-SW) Quadrangle, Tenn.

#### PLATE 260

##### STROPHOMENA

- A. *Strophomena oklahomensis* Cooper, new species..... 942  
 (1-5) Respectively posterior, anterior, side, brachial, and pedicle views,  $\times 2$ , of the holotype, 117738a; (7) pedicle view,  $\times 1$ , of the holotype.  
 Bromide formation (Pooleville member—just above zone with *Multicostella convexa*), dam on Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.
- (6) Exterior of a brachial valve,  $\times 2$ , paratype, 117739a; (10) ornamentation,  $\times 4$ , of the preceding specimen; (8, 9) respectively  $\times 1$  and  $\times 2$  views of the pedicle interior showing the muscle area, paratype, 117739b.  
 Bromide formation (Pooleville member—just above zone with *Multicostella convexa*), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.
- B. *Strophomena crinerensis* Cooper, new species..... 934  
 (12, 13) Brachial and pedicle views of another complete specimen,  $\times 2$ , paratype, 117717a; (21, 22) respectively  $\times 1$  and  $\times 2$  enlargements of a fine pedicle interior showing the muscle field and pallial markings, paratype, 117715; (23) another pedicle interior  $\times 1$ , paratype, 117717c; (24) ornamentation of a brachial valve,  $\times 4$ , paratype, 117717b.  
 Bromide formation (Pooleville member—*Oxoplecia gouldi* zone), Rock Crossing of Hickory Creek, approximately center sec. 35, T. 5 S., R. 1 E., Criner Hills, Carter County, Okla.
- (11) Pedicle exterior of a complete specimen,  $\times 2$ , paratype, 117719c; (14-18) respectively brachial, pedicle, anterior, posterior, and side views,  $\times 2$ , of a paratype, 117716a; (19, 20) brachial and pedicle views,  $\times 1$ , of the same paratype; (25) brachial interior showing cardinalia,  $\times 2$ , paratype, 117719a.  
 Bromide formation (Pooleville member), basal cobbly beds, Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.

#### PLATE 261

##### STROPHOMENA

- A. *Strophomena planobesa* Cooper, new species..... 943  
 (1) Exterior of a small pedicle valve,  $\times 2$ , paratype, 117740g; (2, 3) exterior and interior of the pedicle valve,  $\times 1$ , paratype, 123279a; (4) pedicle interior showing ridge partially surrounding muscle area,  $\times 1$ , paratype, 117740c; (5, 6)

respectively  $\times 1$  and  $\times 2$  enlargements of an imperfect pedicle valve showing muscle scars and subcarinate pseudodeltidium, paratype, 117740e; (7, 8) exterior and interior of the brachial valve,  $\times 1$ , holotype, 117740f; (9, 10) exterior and interior of the holotype,  $\times 2$ , showing ornamentation and cardinalia; (11) posterior of the holotype,  $\times 2$ , showing the cardinal process.

Ridley or Murfreesboro formation, Crystal Creek, 5 miles south of Pikeville, Sequatchie Valley, Pikeville Special (15') Quadrangle, Tenn.

(12) Exterior of another brachial valve,  $\times 1$ , paratype, 123279b; (13) interior of brachial valve showing cardinalia,  $\times 1$ , paratype, 123279c.

Ridley or Murfreesboro formation,  $1\frac{1}{2}$  miles southeast of Hembree Mill, Sequatchie Valley, Pikeville Special (15') Quadrangle, Tenn.

B. *Strophomena planobesa* Cooper, new species..... 943

(14) Exterior of a pedicle valve on a chert slab,  $\times 1$ , paratype, 117741a; (15, 16) interior of two pedicle valves,  $\times 1$ , one showing a thickening around the muscle area, the other not having this feature preserved, paratypes, 117741b, 117741c; (17) brachial interior preserving the cardinalia,  $\times 1$ , paratype, 117741d.

Murfreesboro formation (top), at the junction of the west fork of Stone River with U. S. Highway 70,  $1\frac{1}{2}$  miles northwest of Murfreesboro, Murfreesboro (15') Quadrangle, Tenn.

#### PLATE 262

##### STROPHOMENA

A. *Strophomena bellilineata* Cooper, new species..... 931

(1) Plasticine replica of the exterior of a large pedicle valve,  $\times 1$ , holotype, 117707a; (6, 7) plasticine replica of the pedicle interior showing muscle scars and the impression from which it was made,  $\times 1$ , holotype, 117707a, counterpart to previous figure; (2) plasticine replica of the exterior of a brachial valve,  $\times 1$ , paratype, 117707b; (3, 4) plasticine replica of the brachial interior showing cardinalia, and the impression of the brachial interior from which it was prepared,  $\times 1$ , paratype, 117707c; (5) plasticine replica of the interior of another large brachial valve,  $\times 1$ , paratype, 123283.

Oranda formation, north side of road 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.

B. *Strophomena inspeciosa* Willard..... 939

(8) Exterior of the brachial valve,  $\times 1$ , hypotype, 117726; (11) ornamentation,  $\times 4$ , of the preceding specimen.

Wardell part of Dryden formation, road up Lone Mountain Creek, west of Lone Mountain, Tazewell (T.V.A. 154-NE) Quadrangle, Tenn.

(9, 10) Respectively  $\times 1$  and  $\times 2$  views of the brachial interior, showing cardinalia and median ridge, hypotype, 117727a.

Wardell formation (40 feet below *Hesperorthis* zone), cut on U. S. Highway 25E,  $\frac{1}{2}$  mile north of Indian Creek, Howard Quarter (T.V.A. 162-NW) Quadrangle, Tenn.

#### PLATE 263

##### STROPHOMENA, TRIGRAMMARIA

A. *Trigrammaria winchelli* (Hall and Clarke)..... 875

(1-4) Respectively anterior, side, pedicle, and brachial views of a complete specimen,  $\times 1$ , hypotype, 117752a; (5) brachial view of the preceding specimen enlarged,  $\times 2$ , to show ornamentation; (8, 9) respectively  $\times 2$  and  $\times 1$  views of the interior of a pedicle valve showing the musculature, hypotype, 117752b.

- Page
- Platteville formation (McGregor member), Minneapolis, Minn.  
 (6, 7) Respectively  $\times 1$  and  $\times 2$  views of an imperfect brachial valve showing the cardinalia, hypotype, 123280.  
 Platteville formation,  $1\frac{1}{2}$  miles northeast of Dixon, Dixon (15') Quadrangle, Ill.
- B. *Trigrammaria wilsonae* Cooper, new species..... 875  
 (10-14) Respectively brachial, anterior, posterior, pedicle, and side views,  $\times 1$ , of the holotype, 117753; (15, 16) exterior of the pedicle and brachial valves,  $\times 2$ , showing ornamentation.  
 Rockland formation (Napanee member), on New York Highway 12, on the south side of the Sugar River,  $4\frac{1}{2}$  miles south-southeast of Port Leyden, Port Leyden (15') Quadrangle, N. Y.
- C. *Strophomena auburnensis* Fenton..... 928  
 (17-21) Respectively brachial, posterior, anterior, side, and pedicle views of a large and perfect individual,  $\times 1$ , hypotype, 117702; (22) enlargement of anterior of pedicle valve,  $\times 2$ , of same specimen.  
 Decorah formation (Guttenberg member) (0 to 8 feet above the 8-inch blue clay on top of the Platteville), on Wisconsin Highway 81, 0.1 mile south of the Little Platte River, 2 miles northwest of Platteville, Mineral Point (30') Quadrangle, Wis.

## PLATE 264

## STROPHOMENA

- A. *Strophomena anomala* Cooper, new species..... 927  
 (1-5) Respectively posterior, anterior, pedicle, brachial, and side views,  $\times 2$ , of the holotype, 117700a; (6) brachial view,  $\times 1$ , of the holotype; (7-9) brachial, side, and pedicle views of a complete specimen,  $\times 1$ , paratype, 117701c; (10) brachial view,  $\times 2$ , of the preceding; (11) brachial view of another complete specimen,  $\times 2$ , paratype, 117701d; (12) enlargement of the brachial posterior showing ornamentation and pseudodeltidium,  $\times 4$ , same specimen as preceding; (13, 14) impressions of the pedicle and brachial interiors,  $\times 2$ , paratype, 117701a; (15) plasticine replica of the brachial interior showing cardinalia,  $\times 2$ , prepared from the preceding mold.  
 Benbolt formation (base), 0.2 mile south of the middle fork of Moccasin Creek,  $1\frac{1}{2}$  miles due south of Hansonville, Hansonville (T.V.A. 205-SW) Quadrangle, Va.
- B. *Strophomena inspeciosa* Willard..... 939  
 (16, 18) Respectively  $\times 1$  and  $\times 2$  enlargements of the pedicle exterior, hypotype, 117729c; (17) exterior of another pedicle valve,  $\times 2$ , hypotype, 117729a; (19, 20) respectively  $\times 1$  and  $\times 2$  enlargements of the brachial exterior, hypotype, 117729e; (21) the pedicle interior showing muscle scars,  $\times 2$ , hypotype, 117729d; (22) brachial interior showing the cardinalia,  $\times 2$ , hypotype, 117729b.  
 Carters formation (*Oxoplectia* bed), quarry 0.3 mile north of Gate City, Leeds (15') Quadrangle, Ala.

## PLATE 265

## FURCITELLA, PIONOMENA, STROPHOMENA

- A. *Strophomena planumbona* (Hall)..... 944  
 (1, 2) Respectively  $\times 1$  and  $\times 2$  views of the interior of a large brachial valve showing the cardinalia and the forked septum, figured specimen, 117945.  
 Liberty formation, Dodges Creek,  $1\frac{3}{4}$  miles northwest of Oxford, Ohio.

- |  | Page |
|--|------|
| B. <i>Strophomena okulitchi</i> Cooper, new name.....  | 943  |
| (3) Exterior of an exfoliated pedicle valve, $\times 1$ , McGill Univ., holotype (no number); (4) part of exfoliated exterior of preceding enlarged $\times 4$ to show pseudopunctae pits arranged in radial rows as in <i>Rafinesquina</i> .<br>Leray = Chaumont formation, St. Vincent de Paul, Quebec, Canada.  |      |
| C. <i>Furciella scofieldi</i> (Winchell and Schuchert).....  | 878  |
| (5) Interior of the brachial valve showing the forked septum, $\times 2$ , hypotype, 117749b; (6) interior of the pedicle valve, $\times 2$ , showing the muscle marks, hypotype, 117749a.<br>Prosser formation ( <i>Vellamo</i> bed), St. Paul, Minn.   |      |
| D. <i>Pionomena neumani</i> Cooper, new species.....   | 902  |
| (7) Exterior of an imperfect brachial valve, $\times 2$ , paratype, 117756c; (9) exterior of another but smaller brachial valve, $\times 2$ , paratype, 117756d; (10) exterior of the pedicle valve, $\times 2$ , holotype, 117756a; (11) small slab, $\times 1$ , showing the holotype and two paratypes, the pedicle valve to the northeast being 117756b.<br>New Market formation (top 12 feet), $\frac{1}{2}$ mile southwest of Hicksville, Williamsport (15') Quadrangle, Md. |      |
| (8) Imperfect pedicle valve showing interarea, tooth, and long dental plate on observer's left side, $\times 3$ , paratype, 117755.<br>New Market formation $\frac{3}{4}$ mile north of St. Pauls Church, west of Wilson, Williamsport (15') Quadrangle, Md.   |      |

## PLATE 266

## PLATYMENA, RAFINESQUINA

- |   |     |
|---|-----|
| A. <i>Rafinesquina planulata</i> Cooper, new species.....   | 886 |
| (1) Plasticine replica of the brachial interior, $\times 3$ , paratype, 123281j; (2) impression of the brachial interior, $\times 2$ , showing slots produced by brachiophores, paratype, 123281e; (3, 4) impressions of two pedicle interiors on which the exterior ornamentation has been superimposed, $\times 2$ , paratype, 123281f, and holotype, 123281a.<br>Oranda formation, 0.6 mile northwest of Linville Station, Broadway (15') Quadrangle, Va.  |     |
| B. <i>Rafinesquina sinclairi</i> Salmon.....  | 887 |
| (5) Impression of the pedicle interior, showing form of muscle area and slots representing thickened area bearing the teeth, $\times 1$ , hypotype, 117858b; (7) anterior portion of the preceding specimen, $\times 2$ , showing pseudopunctae arranged in radial rows; (6) exterior of the pedicle valve, $\times 1$ , hypotype, 117858a.<br>Auburn chert, $\frac{1}{2}$ mile east of Auburn, Elsberry (15') Quadrangle, Mo.  |     |
| C. <i>Rafinesquina sinclairi</i> Salmon.....  | 887 |
| (8, 9) Pedicle and brachial views of a complete specimen, $\times 1$ , showing alate cardinal extremities, hypotype, 117859.<br>Barnhart formation, at the Koch Valley School on U. S. Highway 61, NE. corner SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 6, T. 41 N., R. 6 E., 2 miles south of Barnhart, Kimmswick (15') Quadrangle, Mo.   |     |
| D. <i>Platymena plana</i> Cooper, new species.....  | 880 |
| (10-13) Respectively pedicle, anterior, brachial, and side views, $\times 1$ , of the paratype, 117760c; (14) a specimen seen from the pedicle side but from which the pedicle valve has been mostly stripped to show the brachial cardinalia, $\times 4$ , paratype, 117760d; (15) brachial view, $\times 2$ , of another paratype, 117760b; (16) pedicle view, $\times 2$ , of a paratype, 117760a.<br>Arline formation (lower), 100 yards southwest of the Negro Cemetery, $\frac{1}{2}$ mile northeast of Friendsville, Concord (T.V.A. 138-SW) Quadrangle, Tenn. |     |



- E. *Rafinesquina trentonensis* (Conrad)..... 888  
 (17) Pedicle views of three specimens showing the characteristic ornamentation,  $\times 1$ , figured specimen, 123282.  
 Trenton limestone, Trenton Falls, Remsen (15') Quadrangle, N. Y.

## PLATE 267

## COLAPTOMENA

- A. *Colaptomena leptostrophoidea* Cooper, new species..... 890  
 (1) Exterior of the pedicle valve,  $\times 1$ , paratype, 117763e; (2-4) pedicle, brachial, and posterior views of a complete specimen,  $\times 1$ , holotype, 117761; (5) another pedicle exterior,  $\times 1$ , paratype, 117762a; (6, 7) respectively  $\times 1$  and  $\times 2$  enlargements of the exterior of a pedicle valve showing the ornamentation, paratype, 117763a; (8) enlargement of part of the preceding,  $\times 4$ , showing fine lines between the larger costellae; (9) impression of the pedicle interior showing the large muscle area and the pallial marks,  $\times 1\frac{1}{2}$ , paratype, 117762c; (10) imperfect brachial interior,  $\times 1$ , showing muscle area, paratype, 117763b.  
 Martinsburg formation (part with *Brongniartella* and referable to the Salona formation), on Virginia County Road 617=910, 0.15 mile north of Green Mount Church, Broadway (15') Quadrangle, Va.

## PLATE 268

## DINORTHIS, FASCIFERA, OLIGORHYNCHIA, ÖPIKINA, PLECTOCAMARA, PTYCHOGLYPTUS, SOWERBYELLA, STENOCAMARA, XENAMBONITES, ZYGOSPIRA

- A. *Sowerbyella* sp. 1..... 802  
 (1, 2) Respectively anterior and brachial views of a complete specimen,  $\times 2$ , figured specimen, 117544a.  
 Bromide formation (Mountain Lake member), 68 to 84 feet above the basal sand, Spring Creek, sec. 17, T. 2 S., R. 1 W., Murray County, Okla.
- B. *Fascifera convexa* Cooper, new species..... 999  
 (3-5) Respectively brachial, pedicle, and anterior views of an imperfect specimen showing slots of dental plates and size of delthyrial cavity,  $\times 2$ , holotype, 117303a; (6) pedicle view,  $\times 2$ , of a paratype, 117303c.  
 Benbolt formation, roadside 1.6 miles northeast of Heiskell, Powell Station (T.V.A. 137-SE) Quadrangle, Tenn.
- C. *Plectocamara rotunda* Cooper, new species..... 600  
 (7-11) Respectively anterior, side, pedicle, posterior, and brachial views,  $\times 2$ , of the holotype, 117186a.  
 Chatham Hill formation, 1.2 miles S. 31° E. of Sharon Springs, Burkes Garden (15') Quadrangle, Va.
- D. *Ptychoglyptus virginicensis* Willard..... 818  
 (12-15) Respectively posterior, side, brachial, and pedicle views of a nearly perfect specimen,  $\times 3$ , hypotype, 123285f, showing ornamentation well, chilidial plates, and simple cardinal process.  
 Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.
- E. *Öpikina* sp. 5..... 925  
 (16-19) Respectively brachial, anterior, side, and pedicle views of a large individual,  $\times 1$ , figured specimen, 123292a; (20) exterior of a brachial valve having a wide hinge,  $\times 1$ , figured specimen, 123292c; (21) impression of the interior of the pedicle valve showing the muscle scars,  $\times 1$ , figured specimen, 123292d;

	Page
(22-24) respectively pedicle, anterior, and brachial views of a small imperfect specimen, $\times 1$ , figured specimen, 123292b.	
Whistle Creek formation (75 feet above the Knox dolomite), on Indian Run, $\frac{3}{4}$ mile northwest of Lusters Gate, Blacksburg (15') Quadrangle, Va.	
F. <i>Xenambonites undosus</i> Cooper, new species.....	815
(25) Interior of the brachial valve showing cardinalia, platform, and alate form of shell, $\times 4$ , paratype, 117468r; (26) anterior and inner view of the pedicle valve showing the flattened border, $\times 3$ , paratype, 117468g; (27) exterior of the pedicle valve showing peculiar fold and alate form, $\times 4$ , paratype, 117468-1; (28) exterior of the brachial valve showing ornamentation and deep sulcus, $\times 4$ , paratype, 117468m.	
Pratt Ferry formation, 0.2 mile southeast of Pratt Ferry, Blocton (15') Quadrangle, Ala.	
G. <i>Zygospira elongata</i> Cooper, new species.....	670
(29-32) Respectively pedicle, anterior, side, and brachial views, $\times 2$ , of the holotype, 111375a.	
Lebanon formation, Readyville, Cannon County, Tenn.	
H. <i>Stenocamara perplexa</i> Cooper, new species.....	603
(33-37) Respectively anterior, brachial, posterior, pedicle, and side views of a complete specimen, $\times 1$ , paratype, 123289; (38-40) respectively brachial, side, and pedicle views, $\times 2$ , of the same specimen.	
Ellett formation (55 feet above the base), Indian Run, $\frac{3}{4}$ mile northwest of Lusters Gate, Blacksburg (15') Quadrangle, Va.	
I. <i>Oligorhynchia</i> sp. 1.....	663
(41-44) Respectively brachial, side, anterior, and pedicle views of a complete but exfoliated specimen, $\times 3$ , figured specimen, 118018a.	
Sevier = Dryden formation, 0.7 mile south of Mooney Cemetery, Bulls Gap (T.V.A. 171-SE) Quadrangle, Tenn.	
J. <i>Dinorthis transversa</i> Willard.....	398
(45) Plasticine replica of the exterior of the brachial valve, $\times 1$ , hypotype, 118024b; (46) plasticine replica of the exterior of an imperfect specimen, $\times 1$ , hypotype, 118024a; (47) impression of the pedicle interior showing the muscle scars, $\times 1$ , counterpart of the preceding.	
Sevier formation (sandstone No. 5), 0.57 mile southwest of Rocky Branch, Kinzel Springs (T.V.A. 148-NE) Quadrangle, Tenn.	

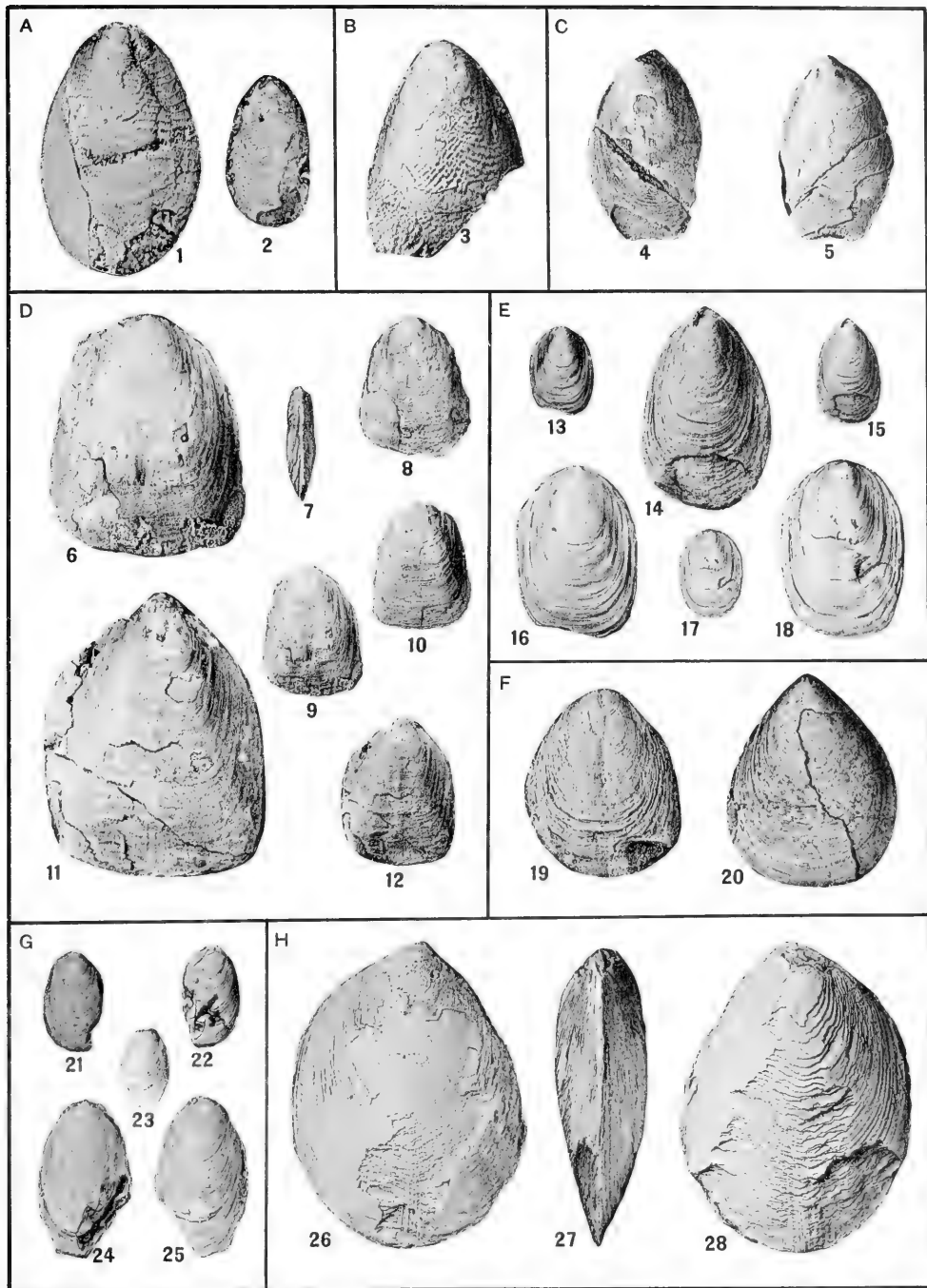
## PLATE 269

## EOPLECTODONTA, HESPERORTHIS, PAURORTHIS, PLECTORTHIS, REUSCHELLA, SOWERBYELLA

A. <i>Plectorthis obesa</i> Cooper, new species.....	450
(1-5) Respectively brachial, posterior, side, anterior, and pedicle views of a complete specimen, $\times 1$ , paratype, 124233a.	
Dark shale below the Eureka quartzite, below two knobs of Eureka quartzite, north side of canyon, 3.1 miles N. 32° E. of Blair (Segura) Ranch, Antelope Mountains, Roberts Mountains (1°) Quadrangle, Nev.	
B. <i>Reuschella vespertina</i> Cooper, new species.....	979
(6-9) Respectively pedicle, anterior, side, and brachial views, $\times 1$ , of the holotype, 124230a, showing deflected sides; (10) posterior view, $\times 1$ , of a paratype, 124230b.	
Horizon and locality same as preceding.	
C. <i>Hesperorthis antelopensis</i> Cooper, new species.....	344
(11-15) Respectively anterior, side, posterior, brachial, and pedicle views, $\times 1$ , of	

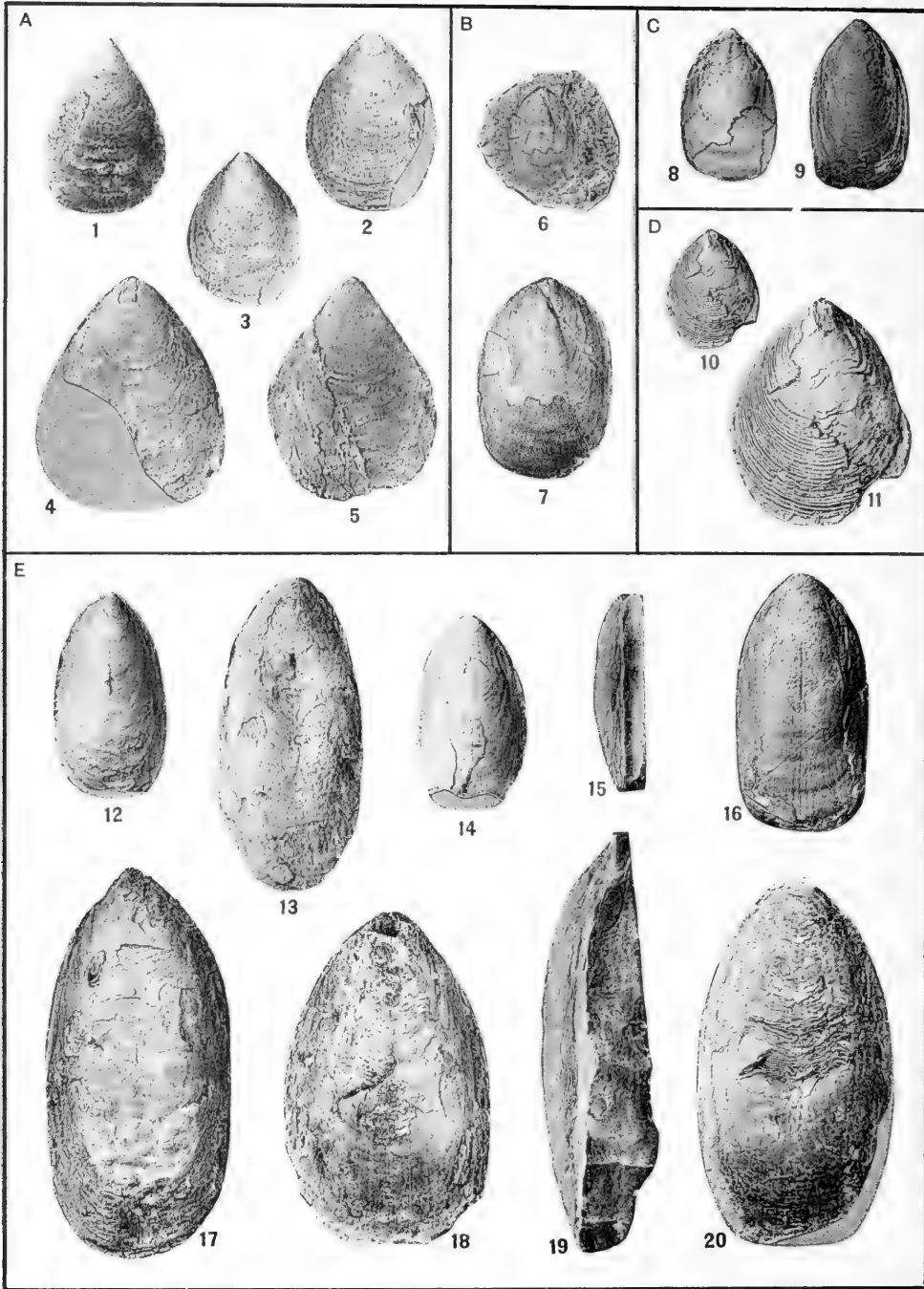
	Page
the holotype, 124232; (16, 17) brachial and posterior views of the holotype, $\times 2$ , showing the interarea and pseudodeltidium. Horizon and locality same as preceding.	
D. <i>Sowerbyella merriami</i> Cooper, new species.....	785
(18-22) Respectively anterior, pedicle, brachial, posterior, and side views, $\times 1$ , of the holotype, 124234a. Horizon and locality same as preceding.	
E. <i>Eoplectodonta alternata</i> (Butts).....	808
(23) Brachial view of a nearly complete specimen, $\times 2$ , showing posterior wrinkles and ornamentation, hypotype, 124231a; (24) pedicle view of another specimen showing the same features, $\times 2$ , hypotype, 124231b. Horizon and locality same as preceding.	
F. <i>Paurorthis gigantea</i> Cooper, new species.....	967
(25-29) Respectively posterior, brachial, side, anterior, and pedicle views, $\times 1$ , of the holotype, 124235a; (30) brachial view of the holotype, $\times 2$ , showing the gentle fascicles and fine costellae; (31) interior of the pedicle valve, $\times 2$ , showing large teeth with crural fossettes, delthyrial cavity, and thick median ridge, paratype, 124235c. Horizon and locality same as preceding.	



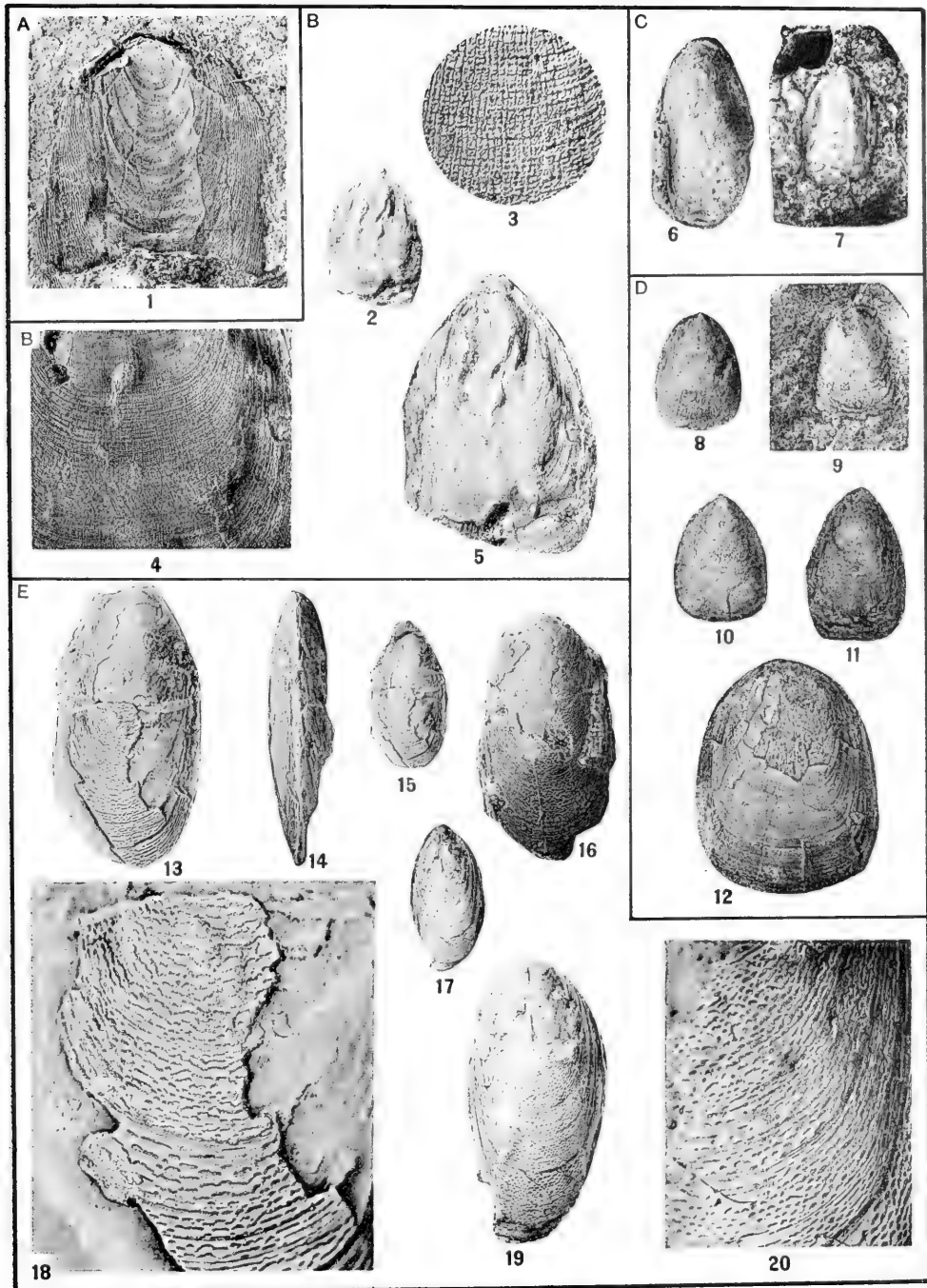


LINGULELLA, OBOLUS, PSEUDOLINGULA, WESTONIA

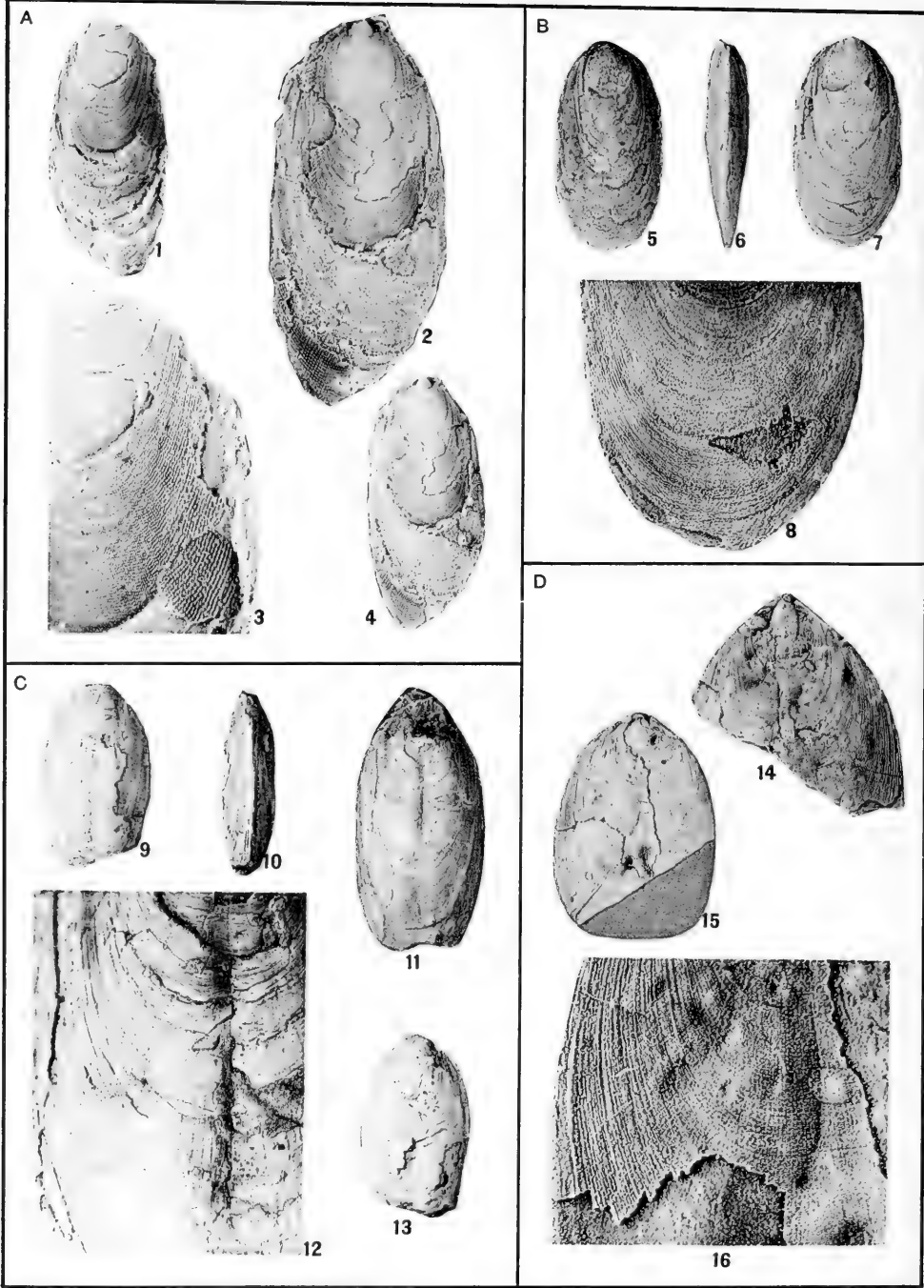
(SEE EXPLANATION OF PLATES.)



ECTENOGLOSSA, LINGULELLA, OBOLUS, SPINILINGULA  
(SEE EXPLANATION OF PLATES.)

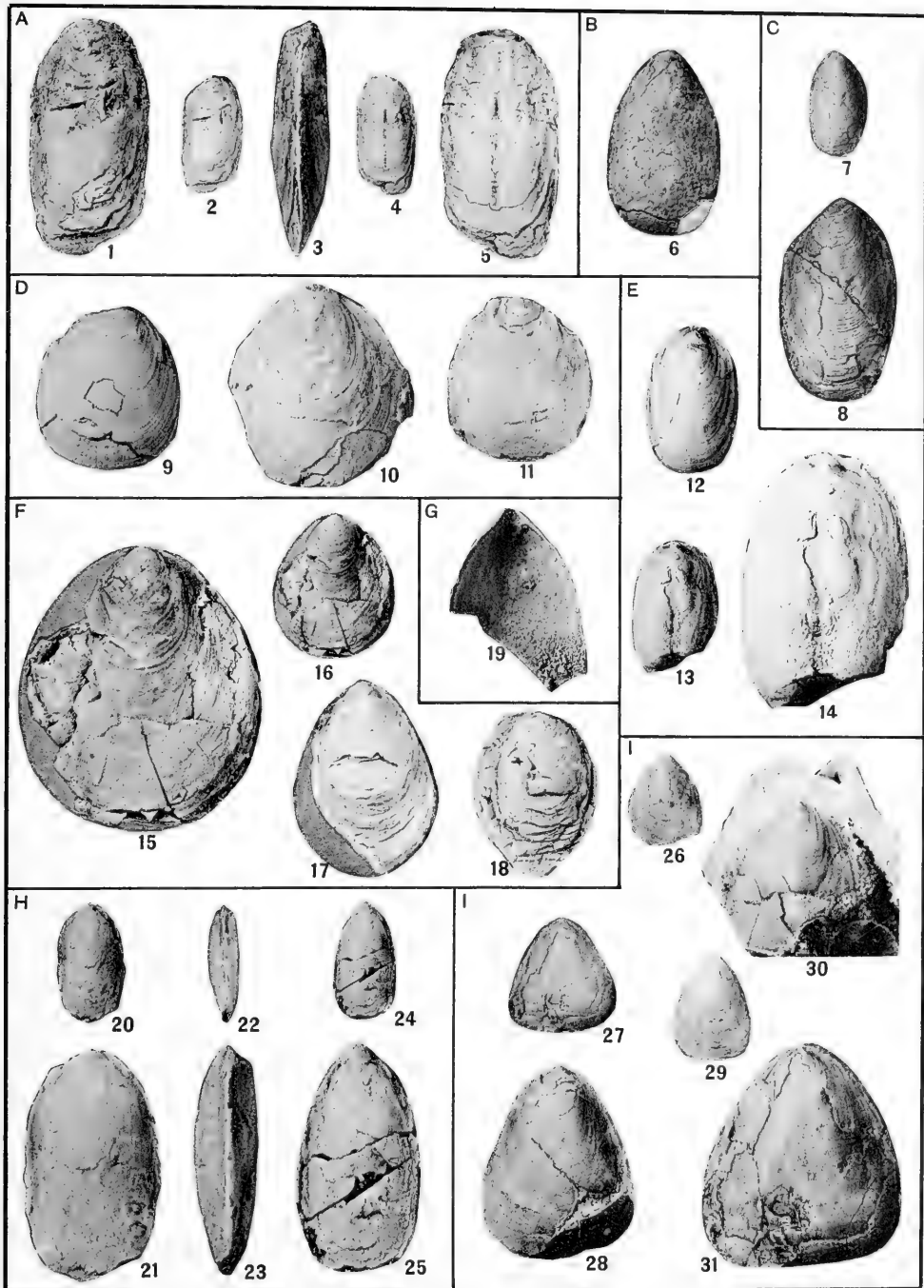


ECTENOGLOSSA, GLOSSELLA, GLYPTOGLOSSA, LINGULELLA, PSEUDOLINGULA  
 (SEE EXPLANATION OF PLATES.)

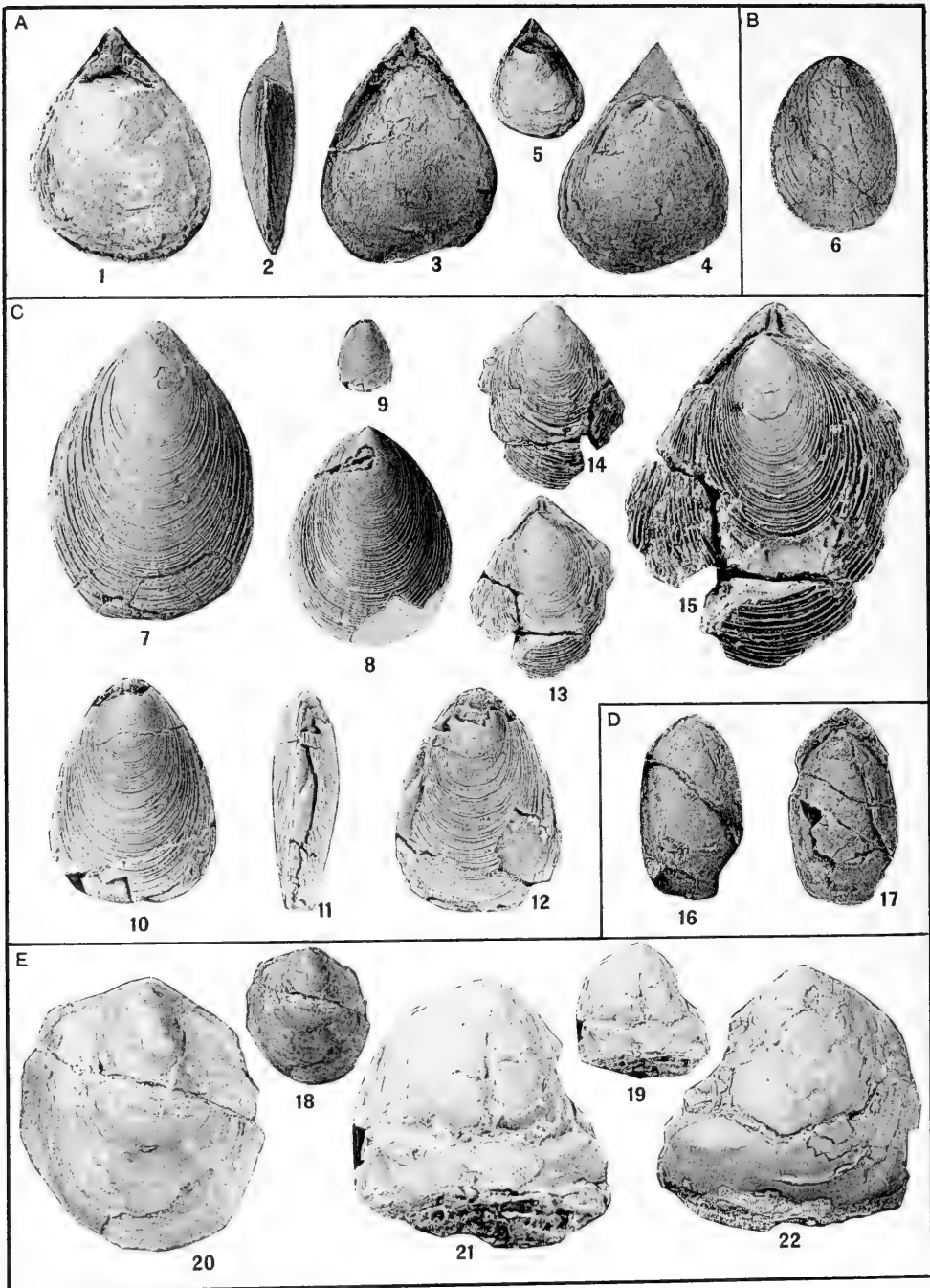


ECTENOGLOSSA, GLOSSELLA, LINGULELLA  
(SEE EXPLANATION OF PLATES.)

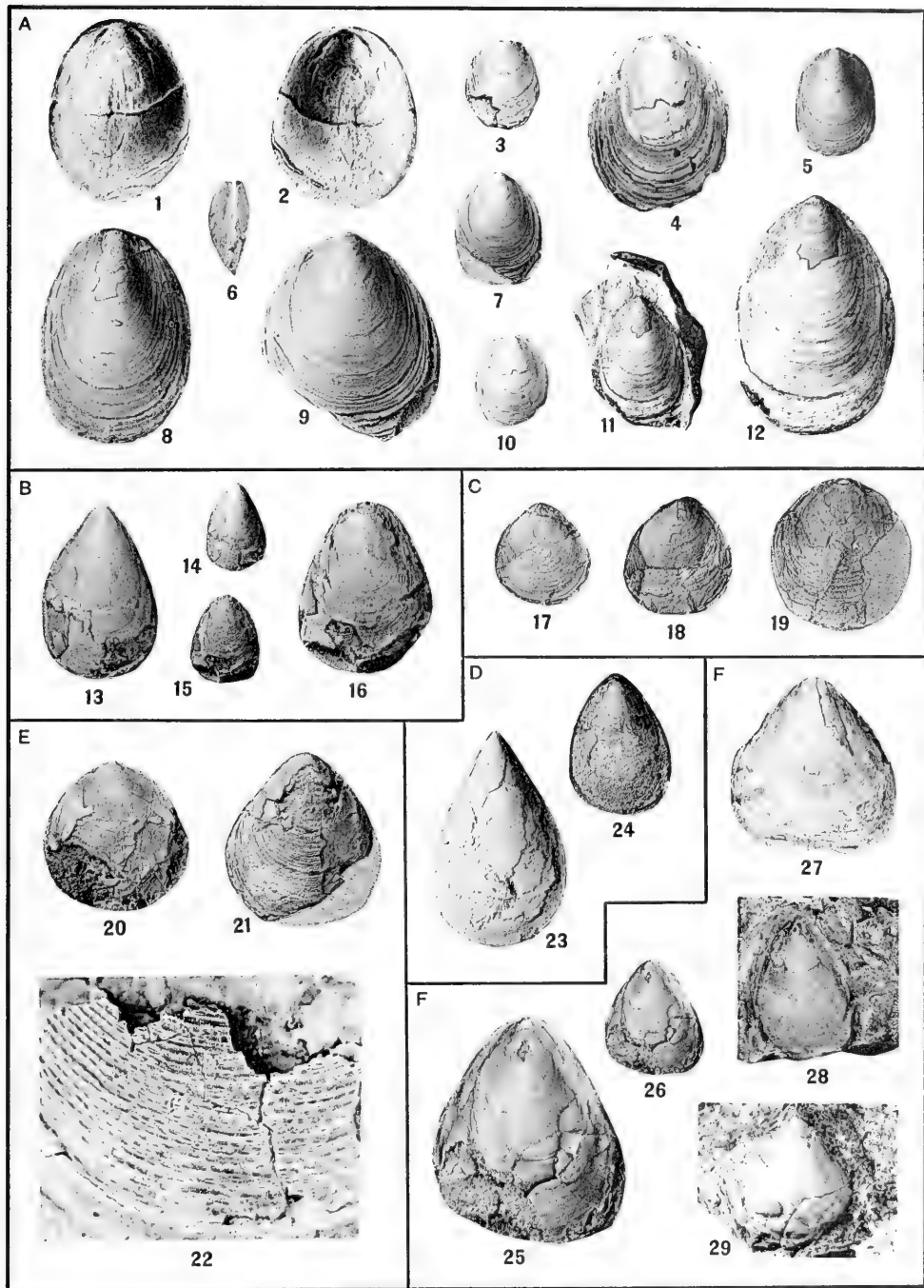




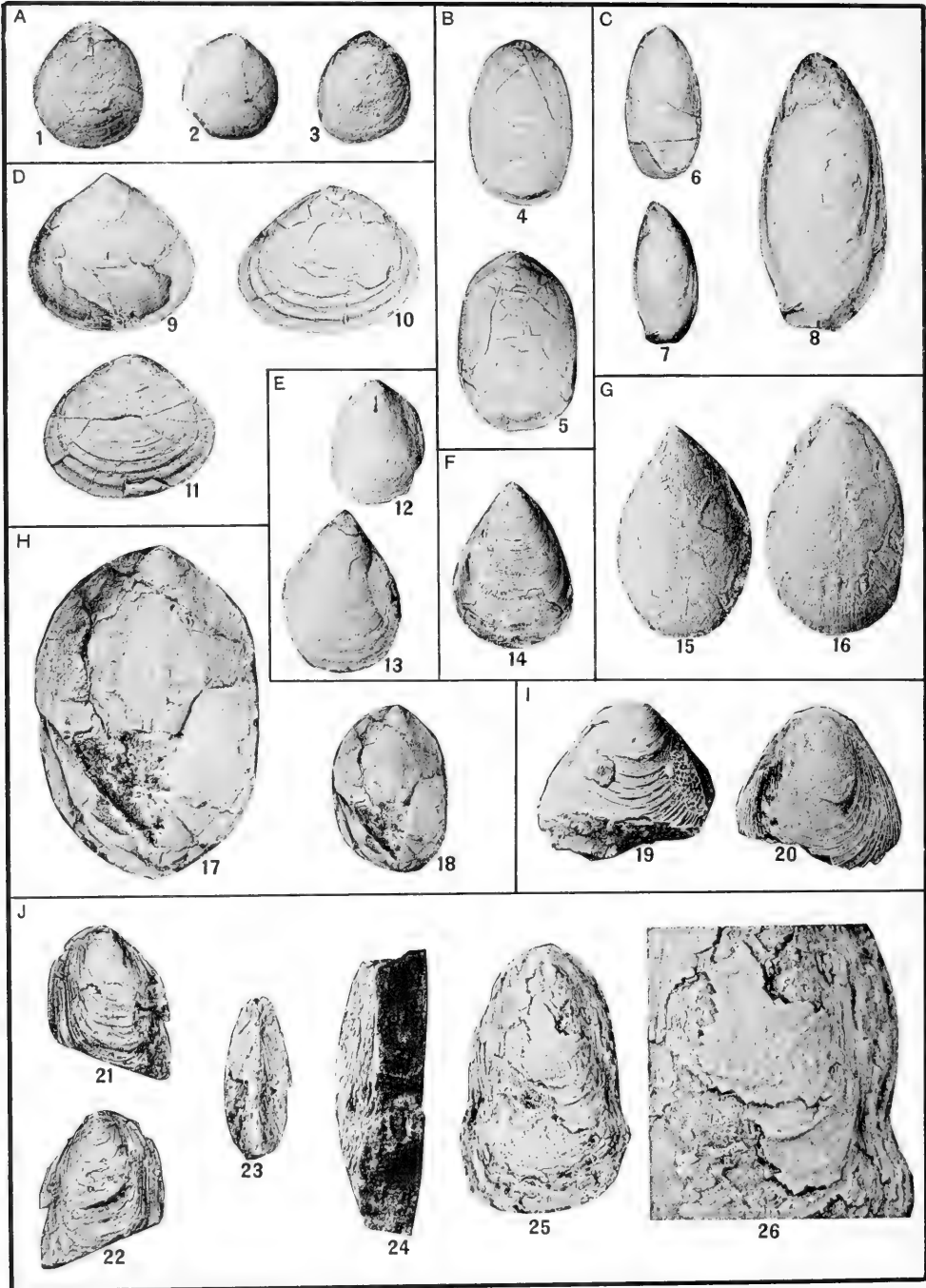
GLOSSELLA, LINGULELLA, PACHYGLOSSA, PSEUDOLINGULA  
 (SEE EXPLANATION OF PLATES.)



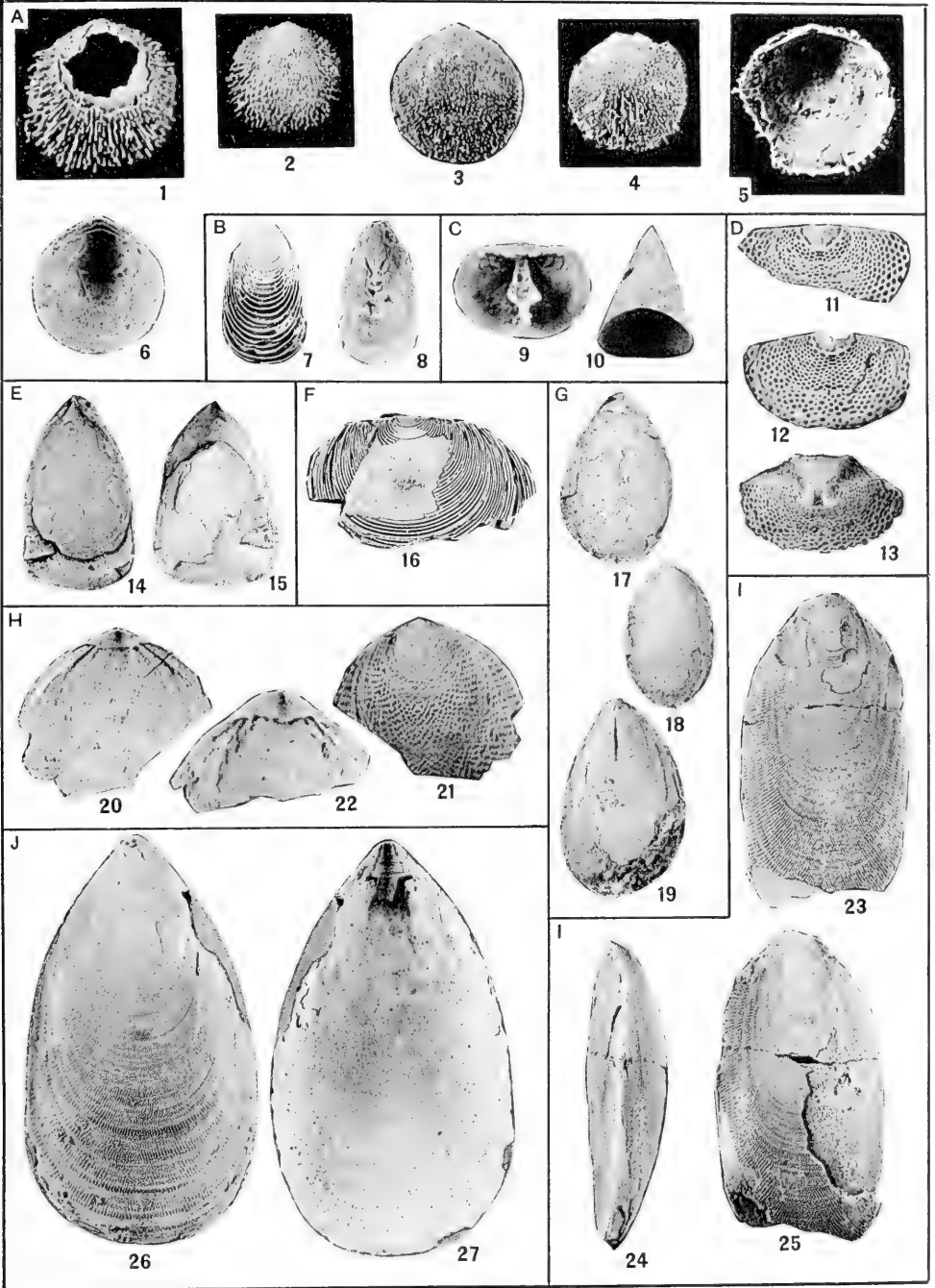
ECTENOGLOSSA, LINGULELLA, PACHYGLOSSA, PLECTOGLOSSA, PSEUDOLINGULA  
 (SEE EXPLANATION OF PLATES.)



LINGULELLA, OBOLUS, PACHYGLOSSA, PALAEOGLOSSA  
(SEE EXPLANATION OF PLATES.)

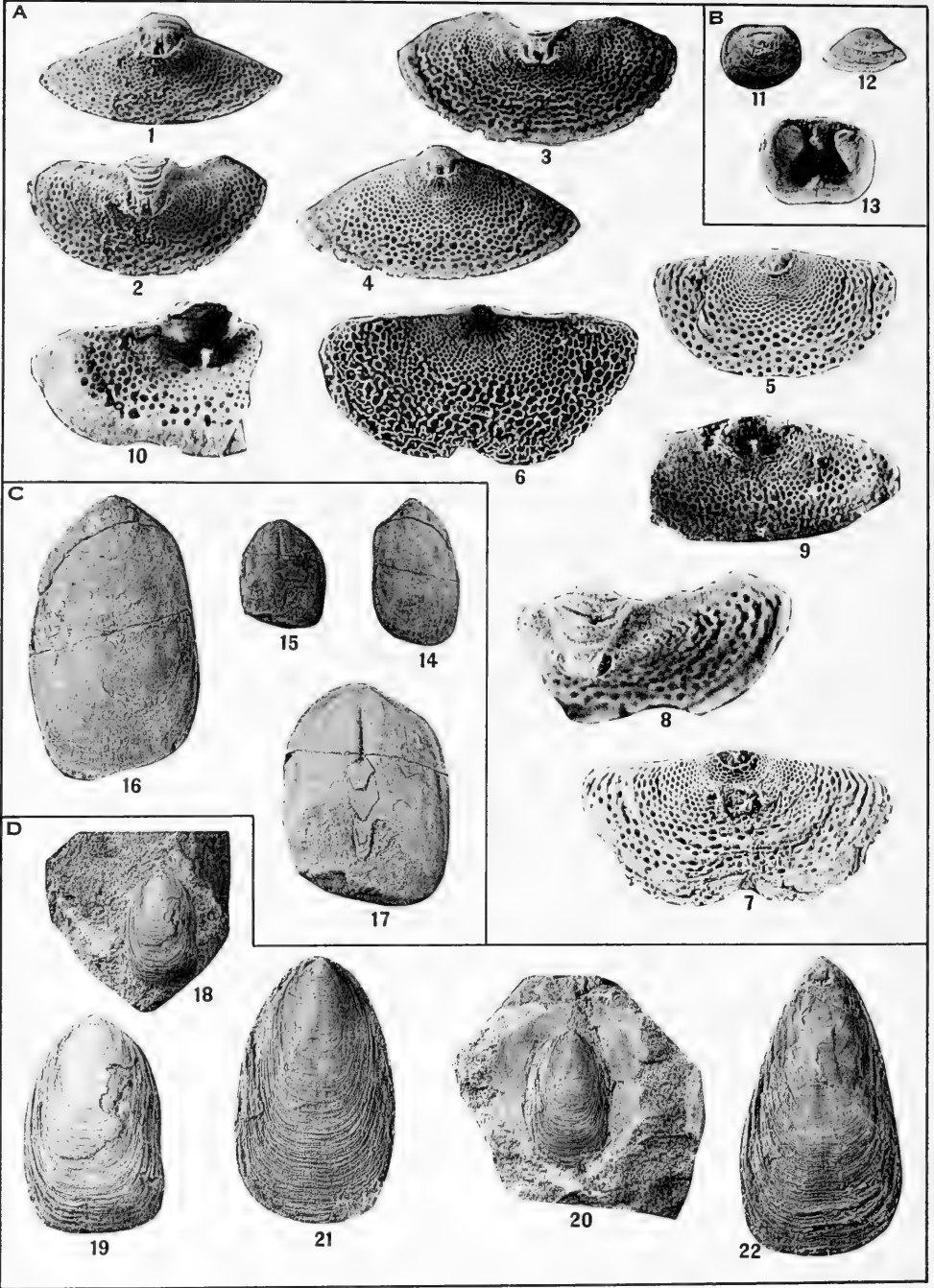


ECTENOGLOSSA, LINGULELLA, OBOLUS, PLECTOGLOSSA  
(SEE EXPLANATION OF PLATES.)

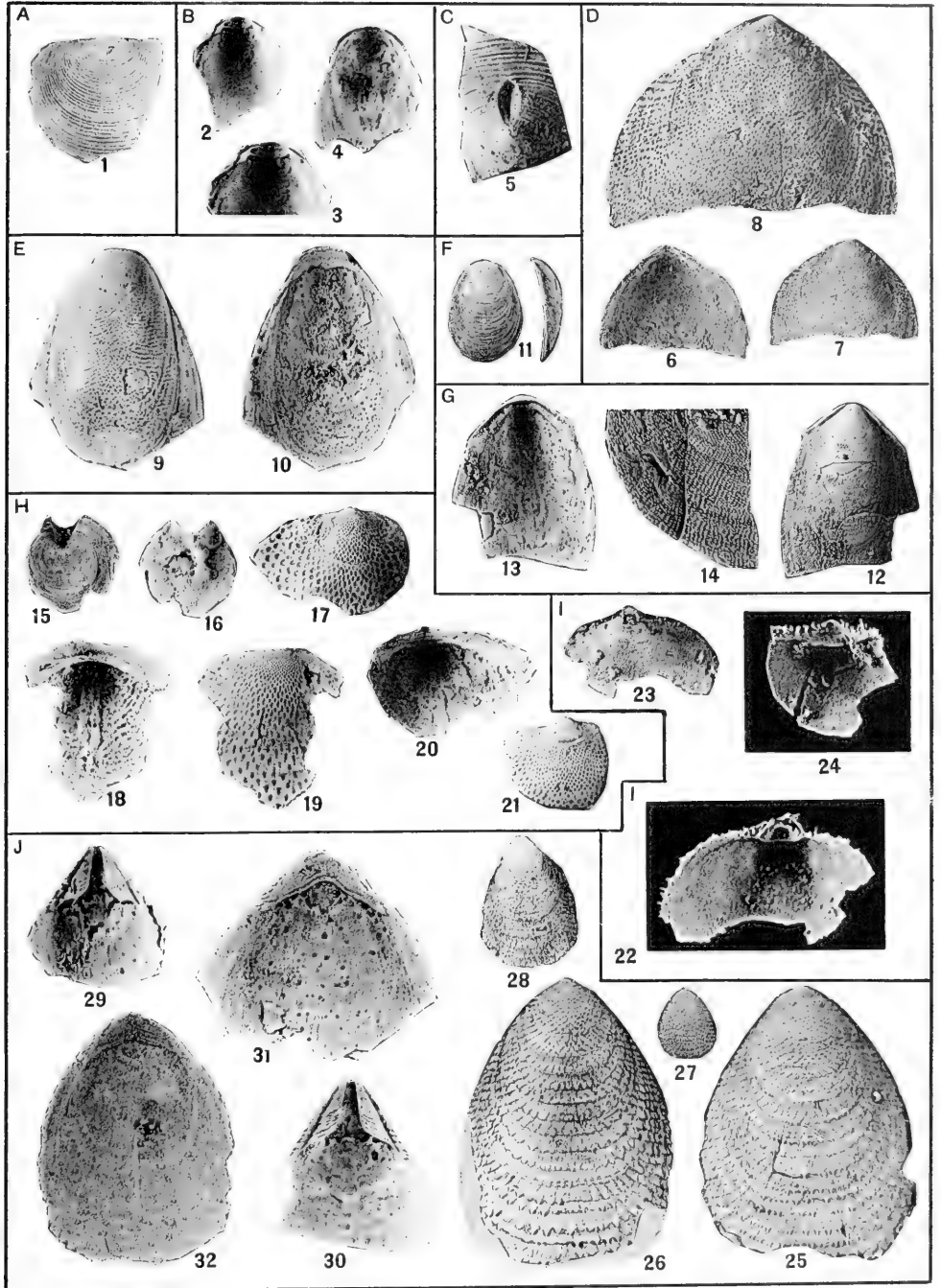


ACANTHAMBONIA, DICTYONITES, GLOSSELLA, LINGULELLA, OBOLUS, PALAEOGLOSSA, TORYNELASMA

(SEE EXPLANATION OF PLATES.)

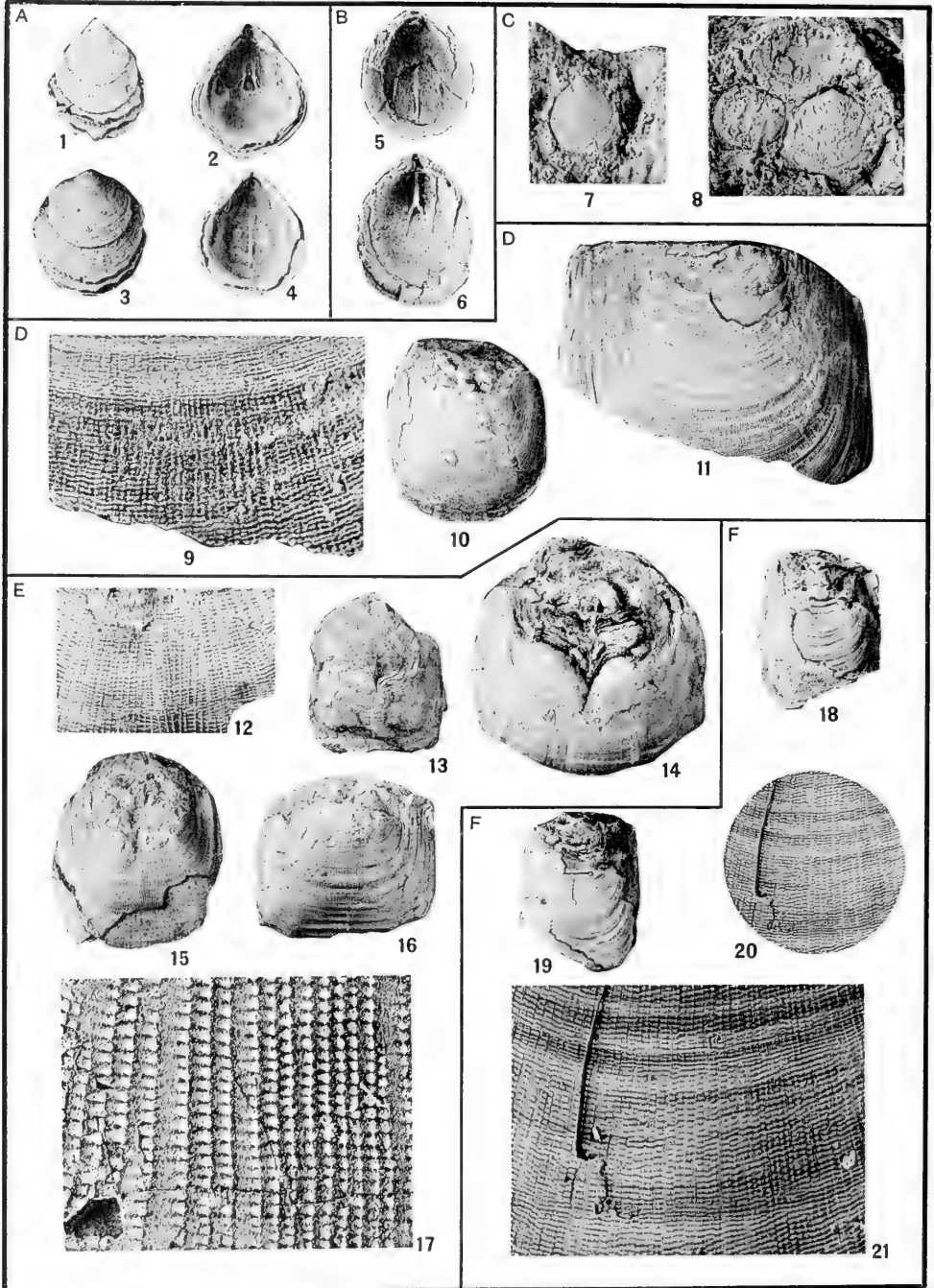


DICTYONITES, EOCONULUS, LINGULELLA, PALAEOGLOSSA  
(SEE EXPLANATION OF PLATES.)



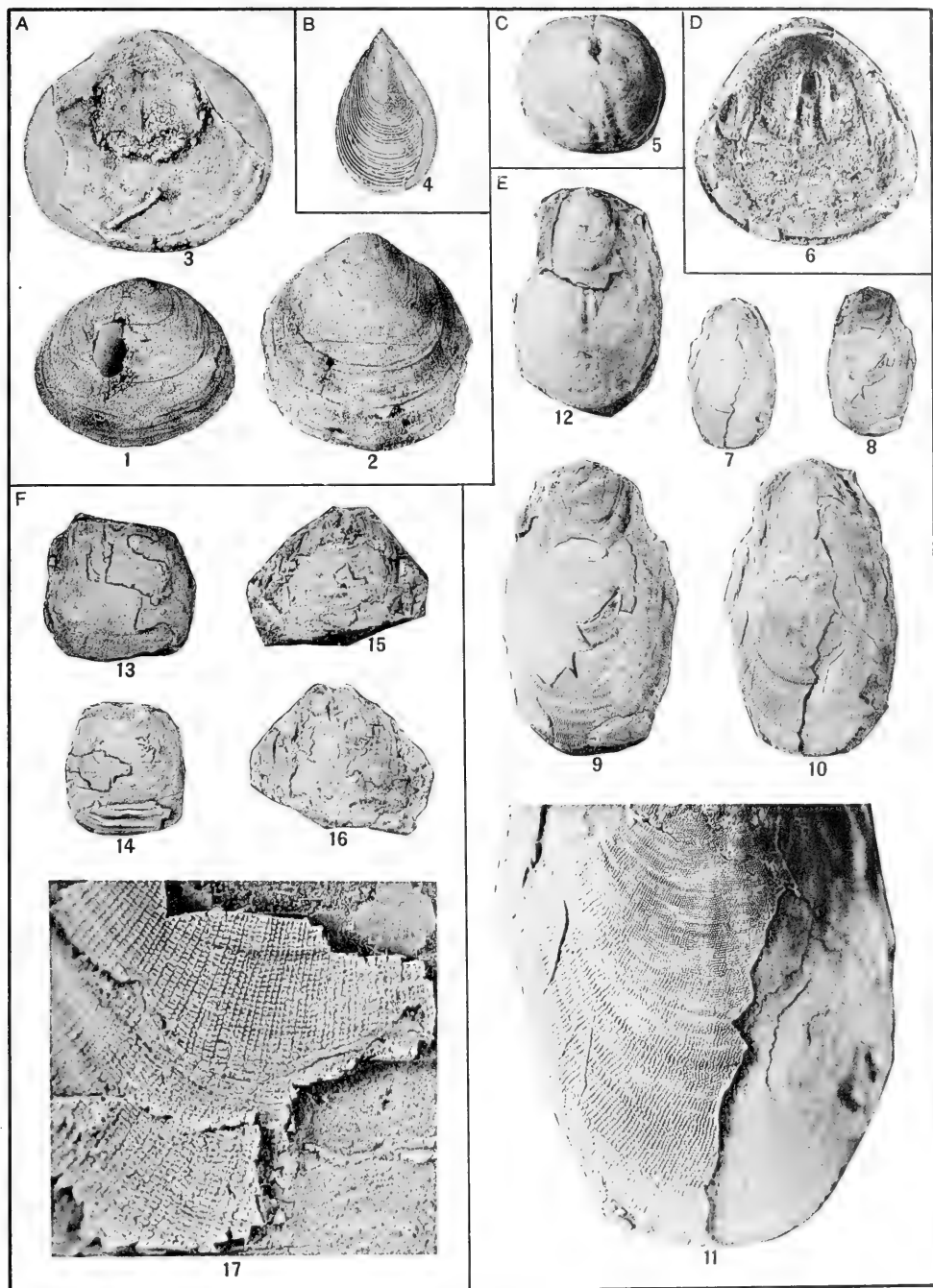
GLOSSELLA, LINGULELLA, OBOLUS, PACHYGLOSSA, SCHIZOTRETA, SPINILINGULA  
TREMATIS, WESTONIA

(SEE EXPLANATION OF PLATES.)



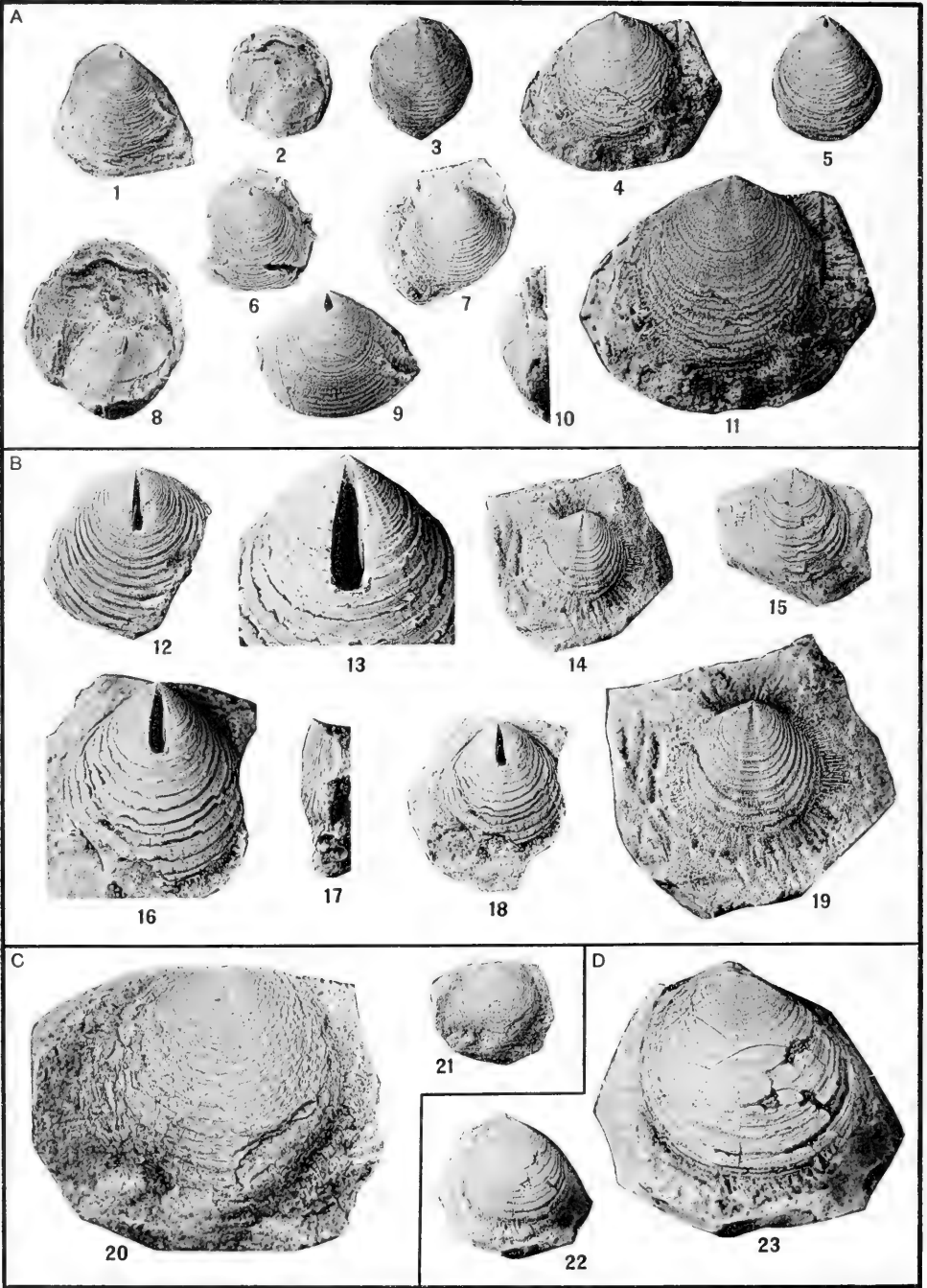
LEPTOBOLUS, LINGULASMA  
(SEE EXPLANATION OF PLATES.)



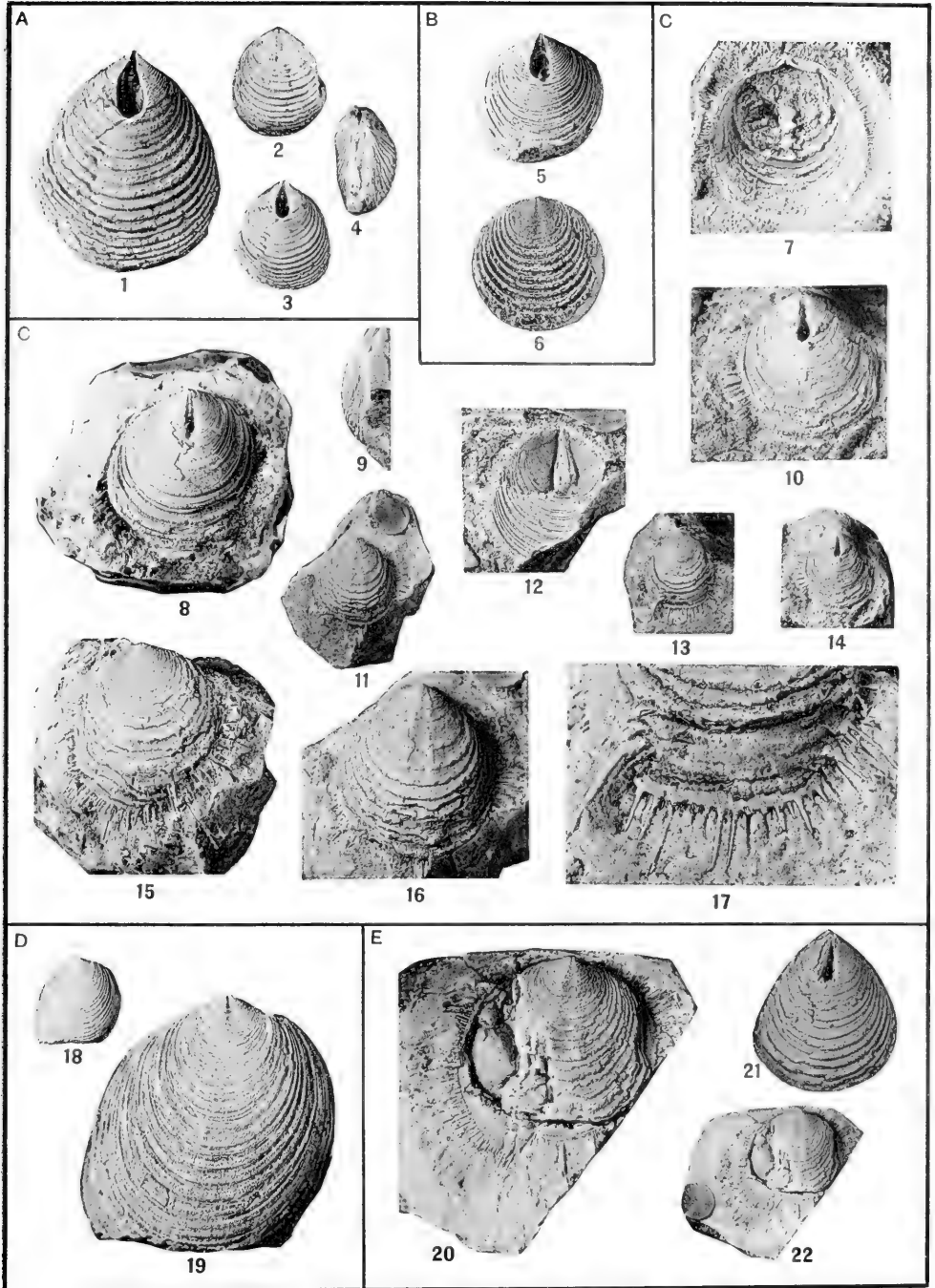


GLOSSELLA, GLYPTOGLOSSA, LINGULASMA, OBOLELLINA, ORBICULOIDEA,  
SCHIZAMBON

(SEE EXPLANATION OF PLATES.)

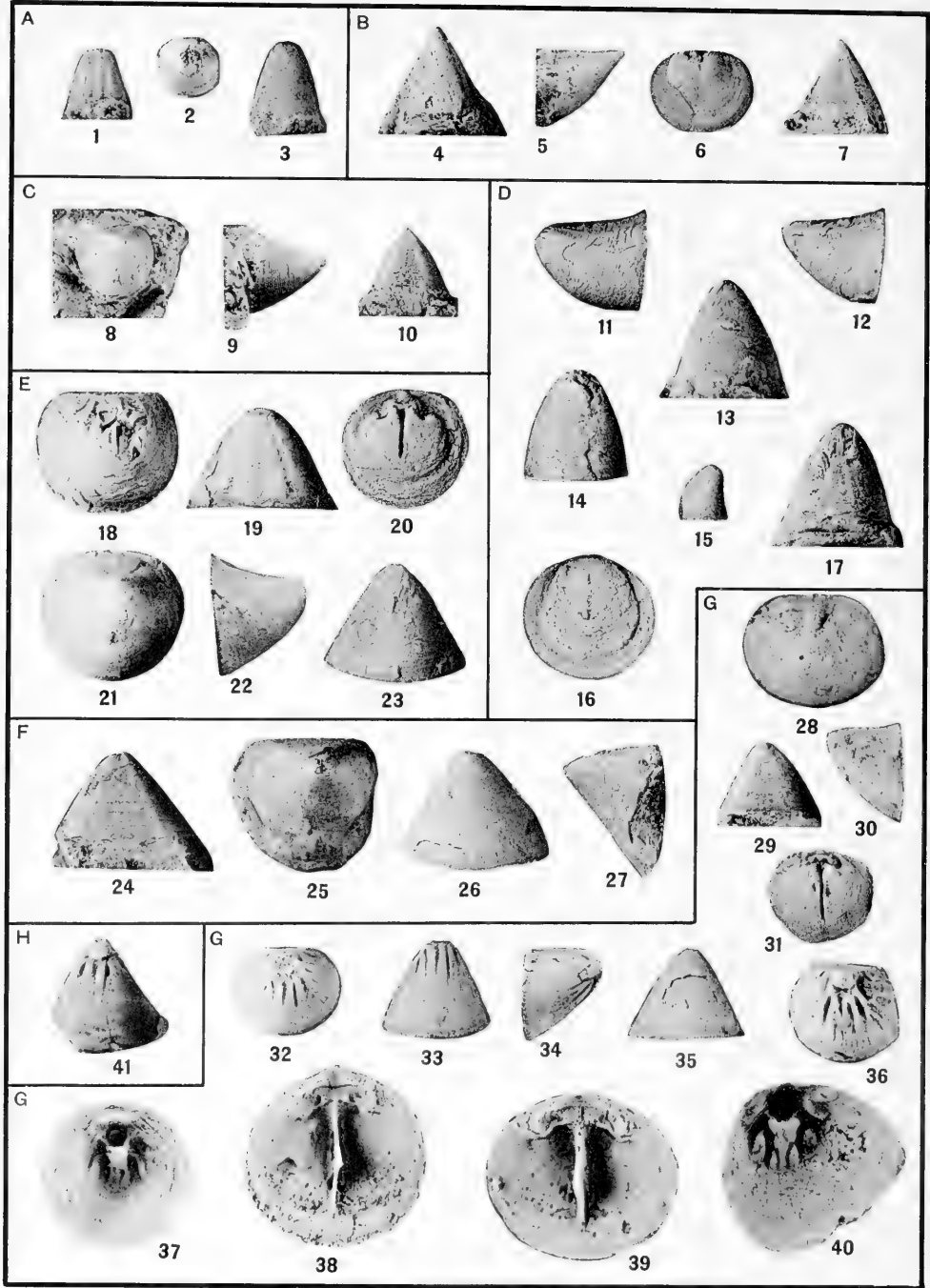


SCHIZAMBON, SIPHONOTRETA  
(SEE EXPLANATION OF PLATES.)

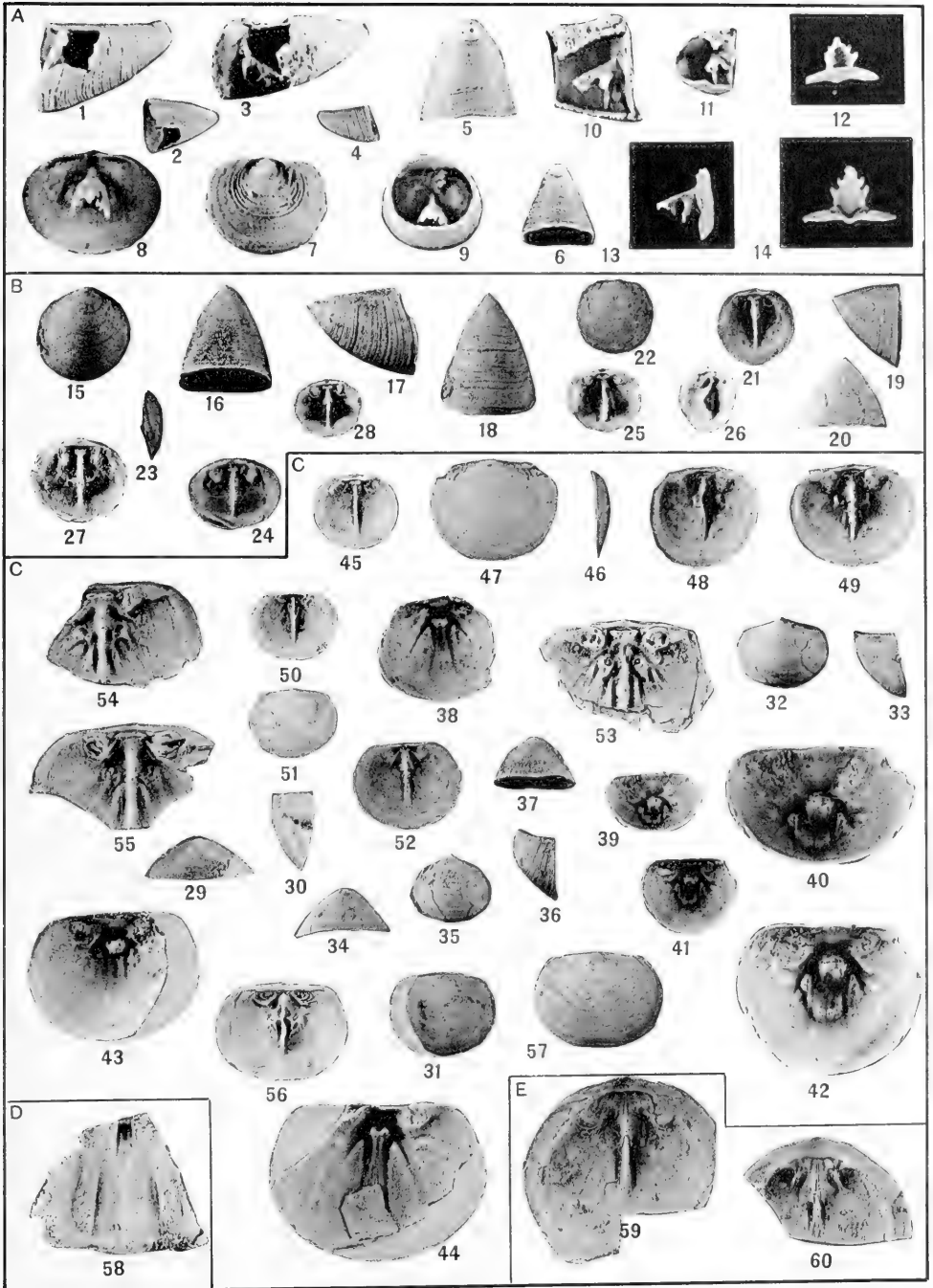


SCHIZAMBON

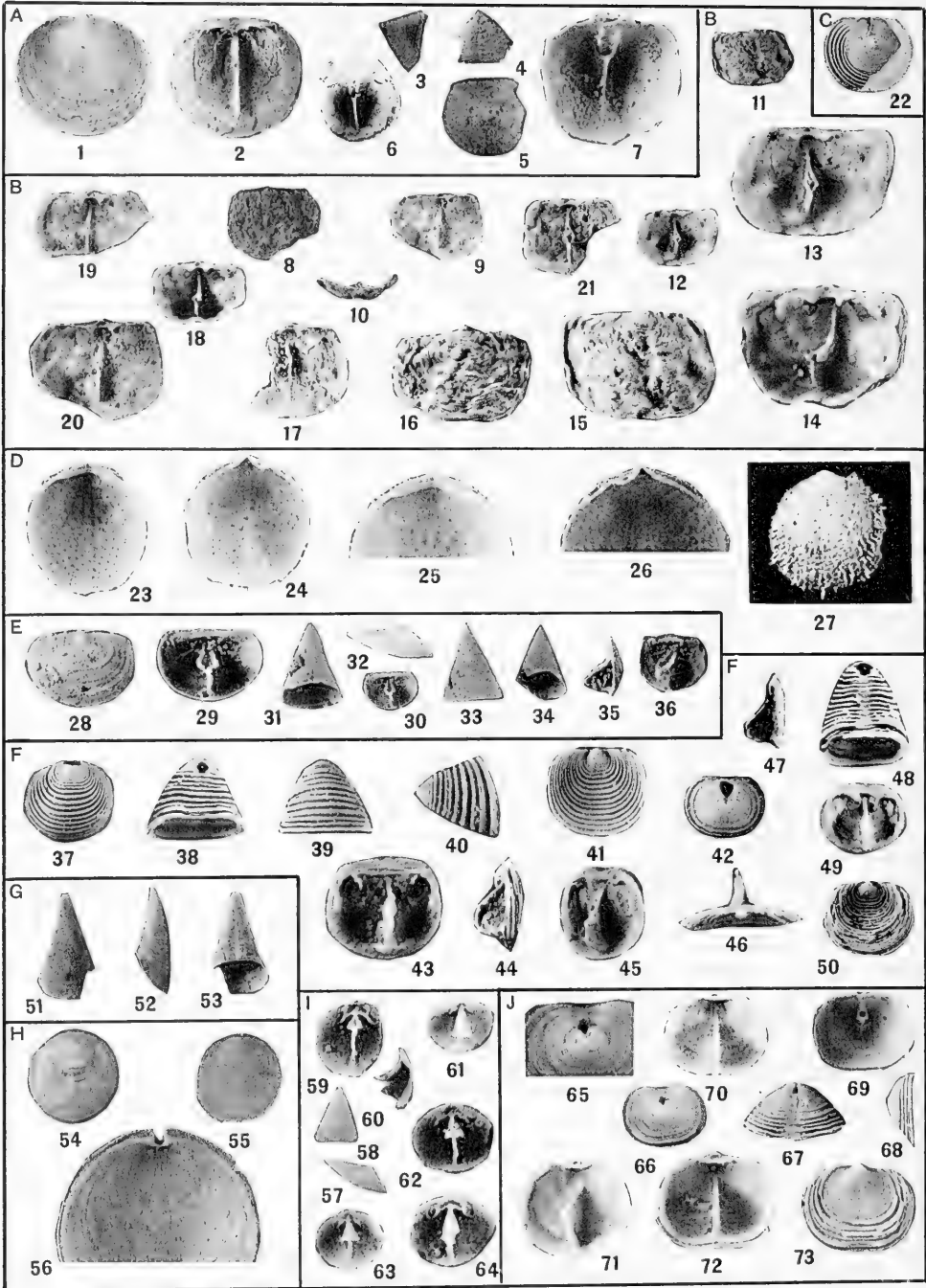
(SEE EXPLANATION OF PLATES.)



CONOTRETA, SPONDYLOTRETA  
(SEE EXPLANATION OF PLATES.)

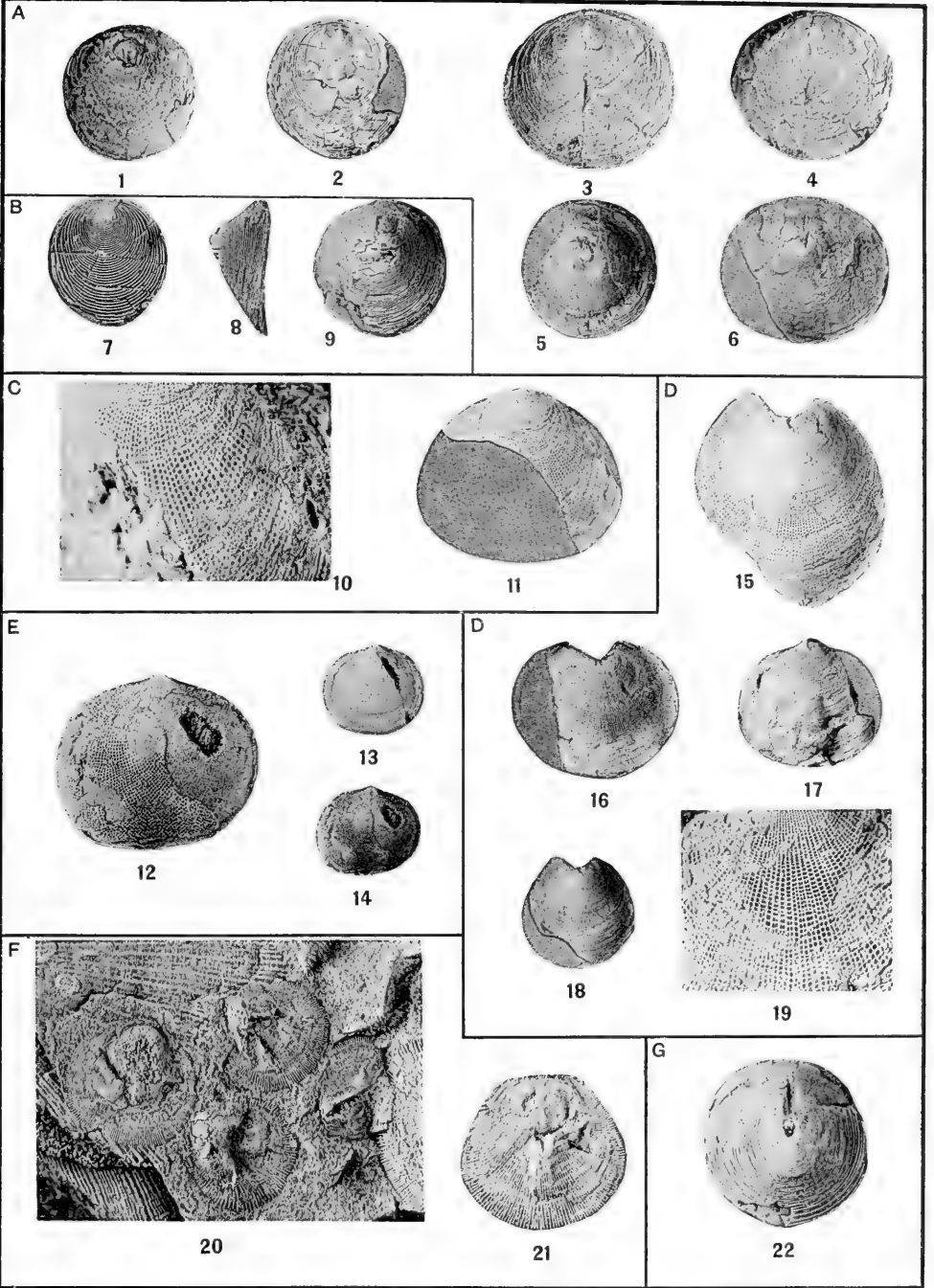


EPHIPPELASMA, CONOTRETA  
(SEE EXPLANATION OF PLATES.)

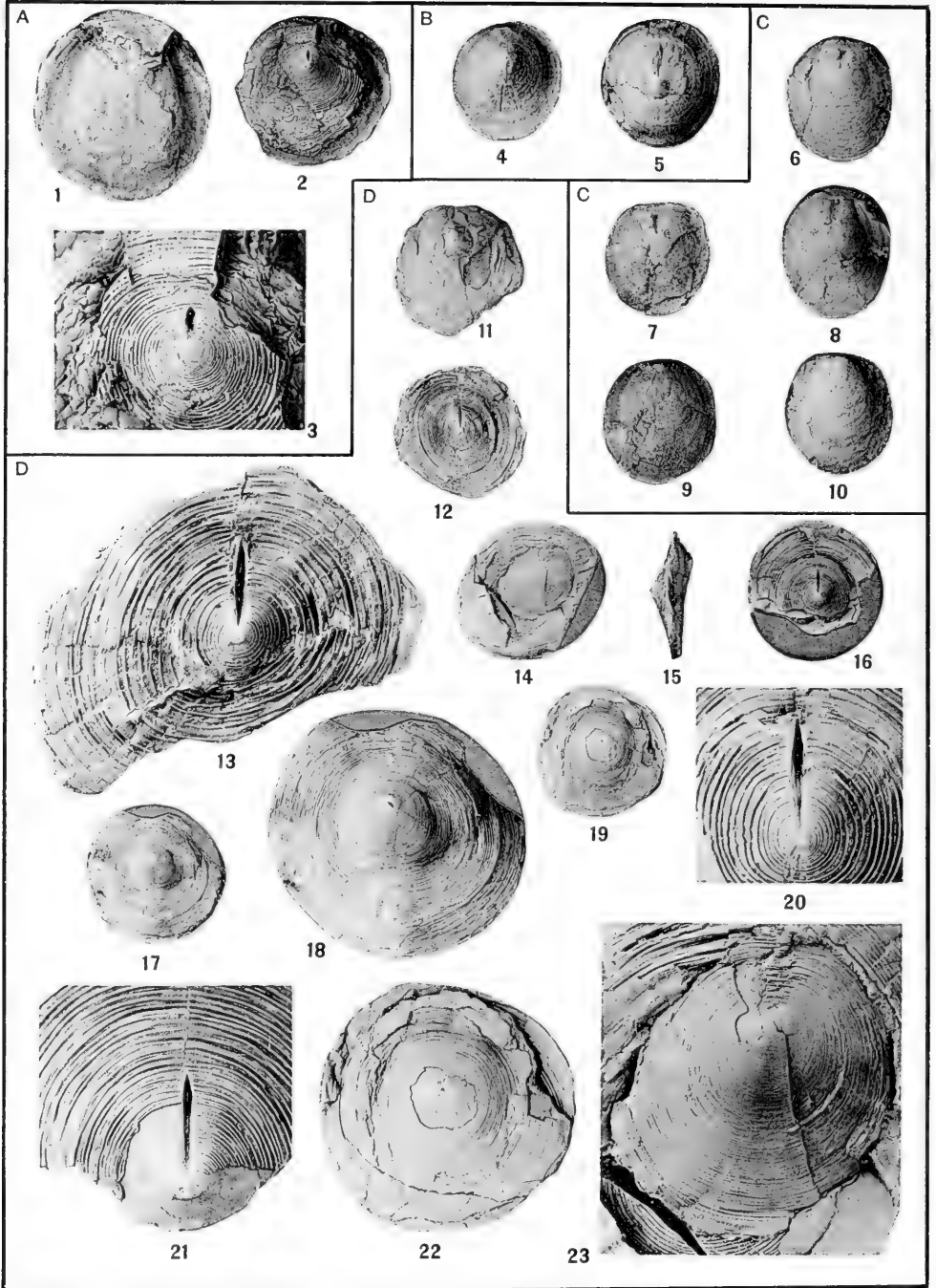


ACANTHAMBONIA, CONOTRETA, PATERULA, RHYOTRETA, SCAPHELASMA, SPONDYLOTRETA, TORYNELASMA, UNDIFERINA

(SEE EXPLANATION OF PLATES.)



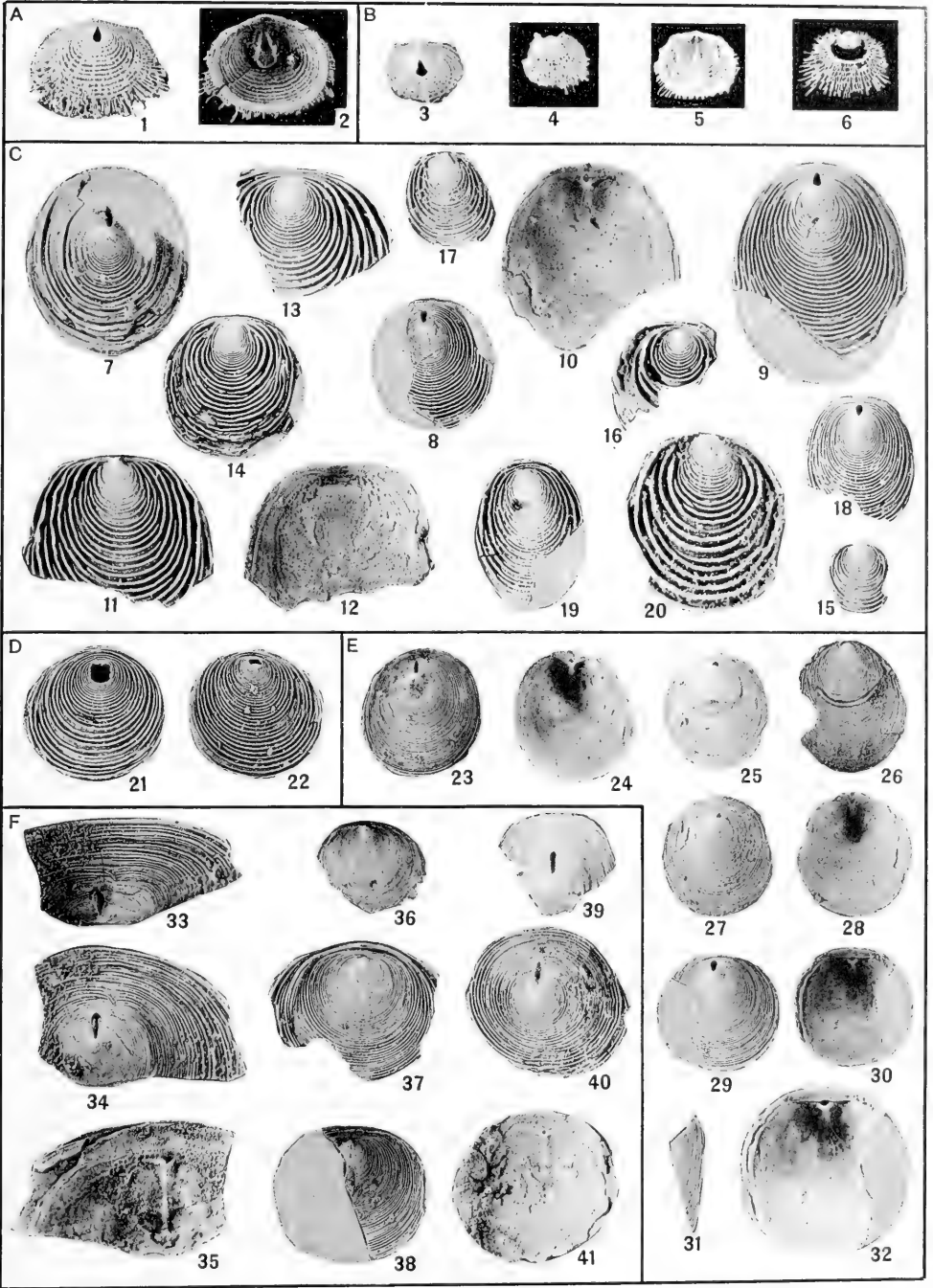
SCHIZOCRANIA, SCHIZOTRETA, TREMATIS  
(SEE EXPLANATION OF PLATES.)



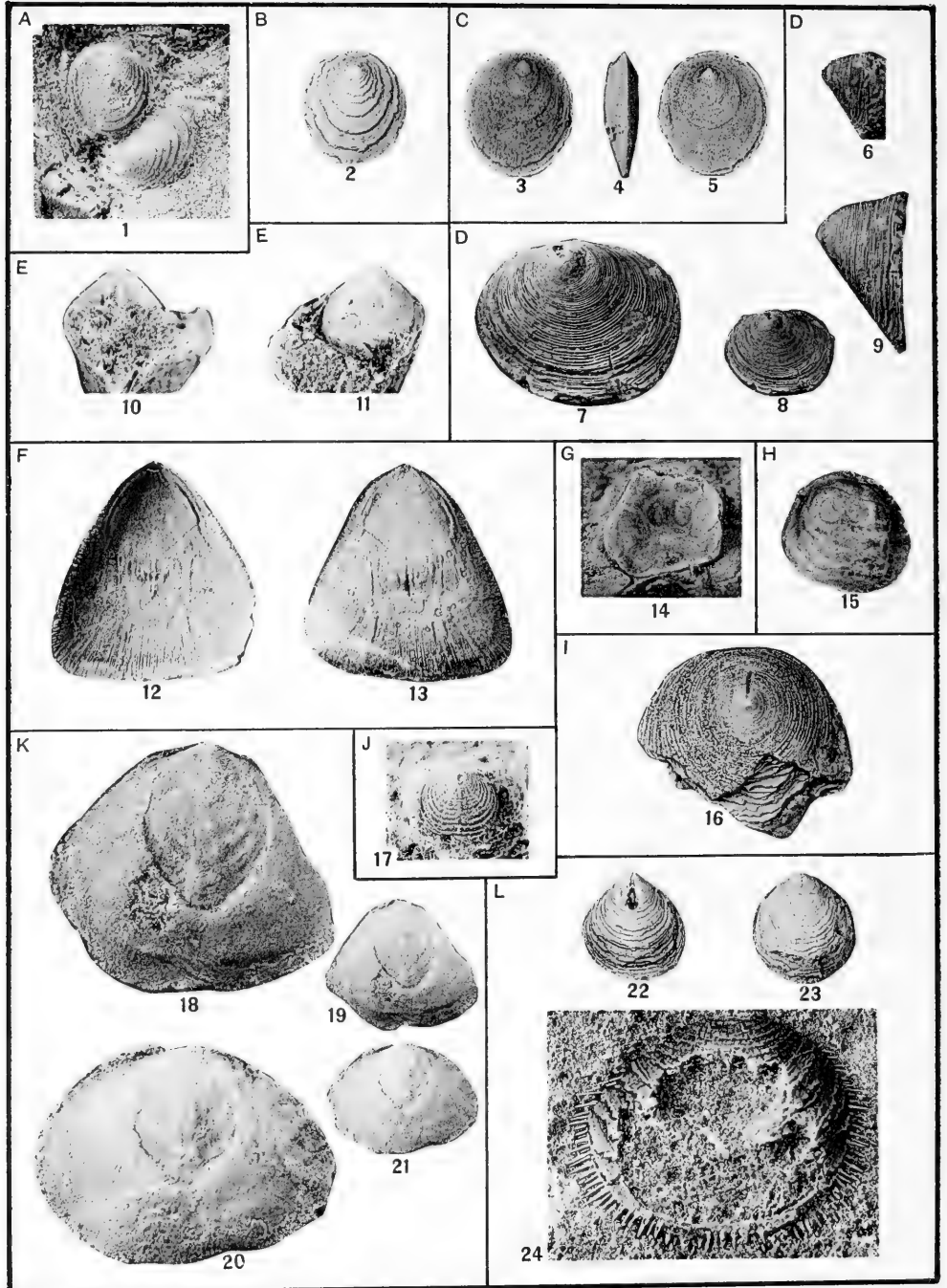
ORBICULOIDEA, SCHIZOTRETA

(SEE EXPLANATION OF PLATES.)

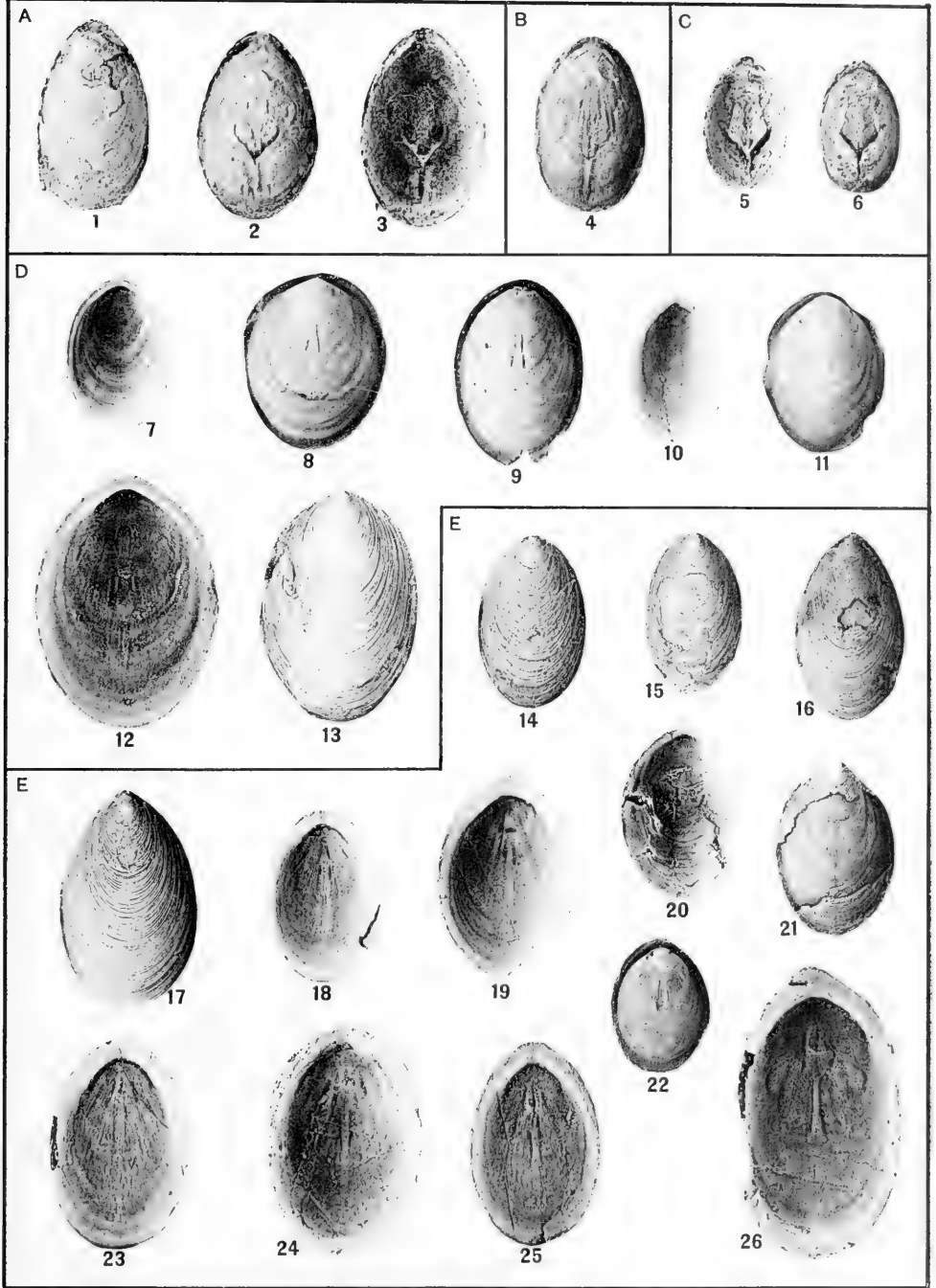




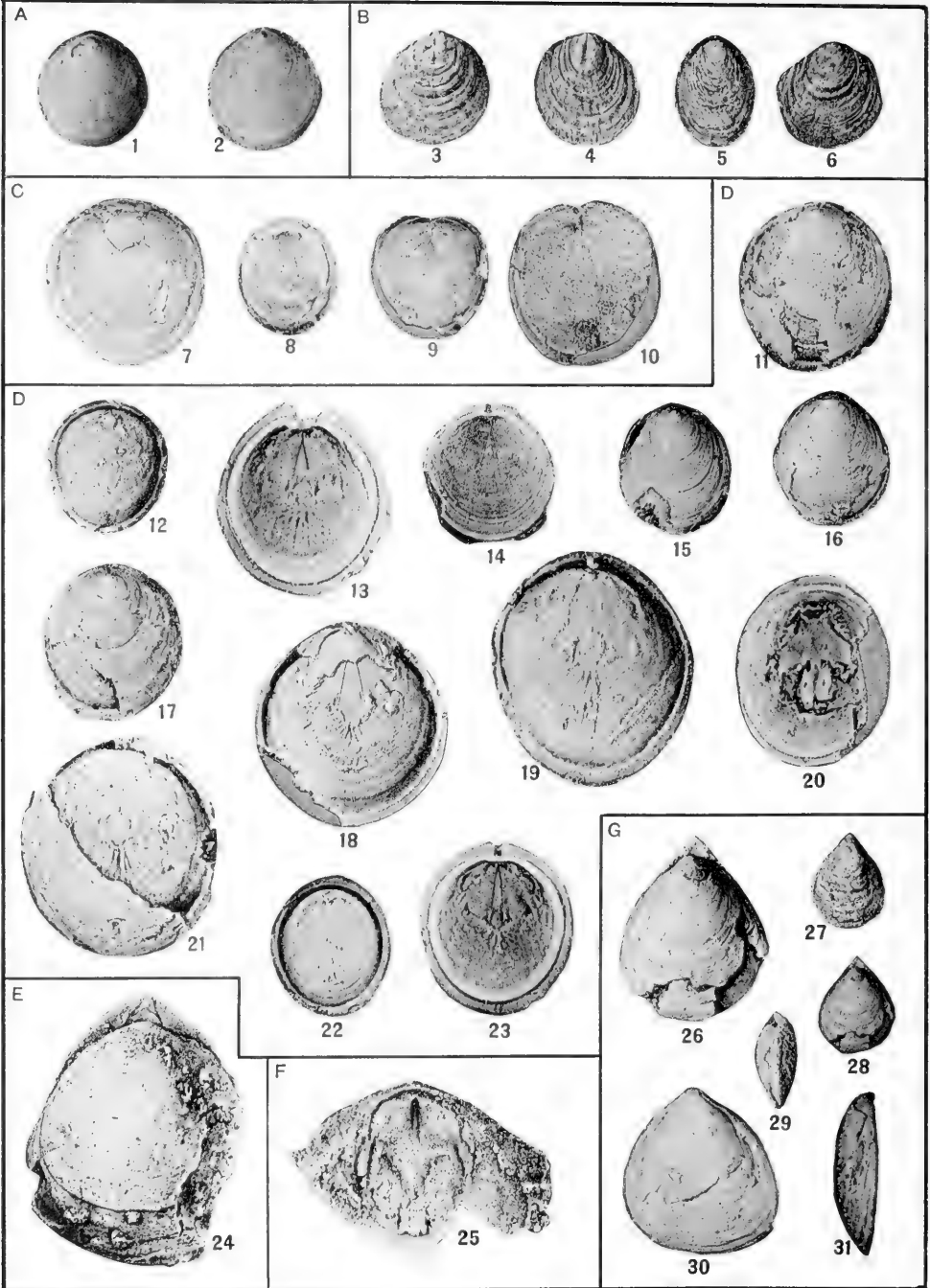
SCHIZAMBON, SCHIZOTRETA  
(SEE EXPLANATION OF PLATES.)



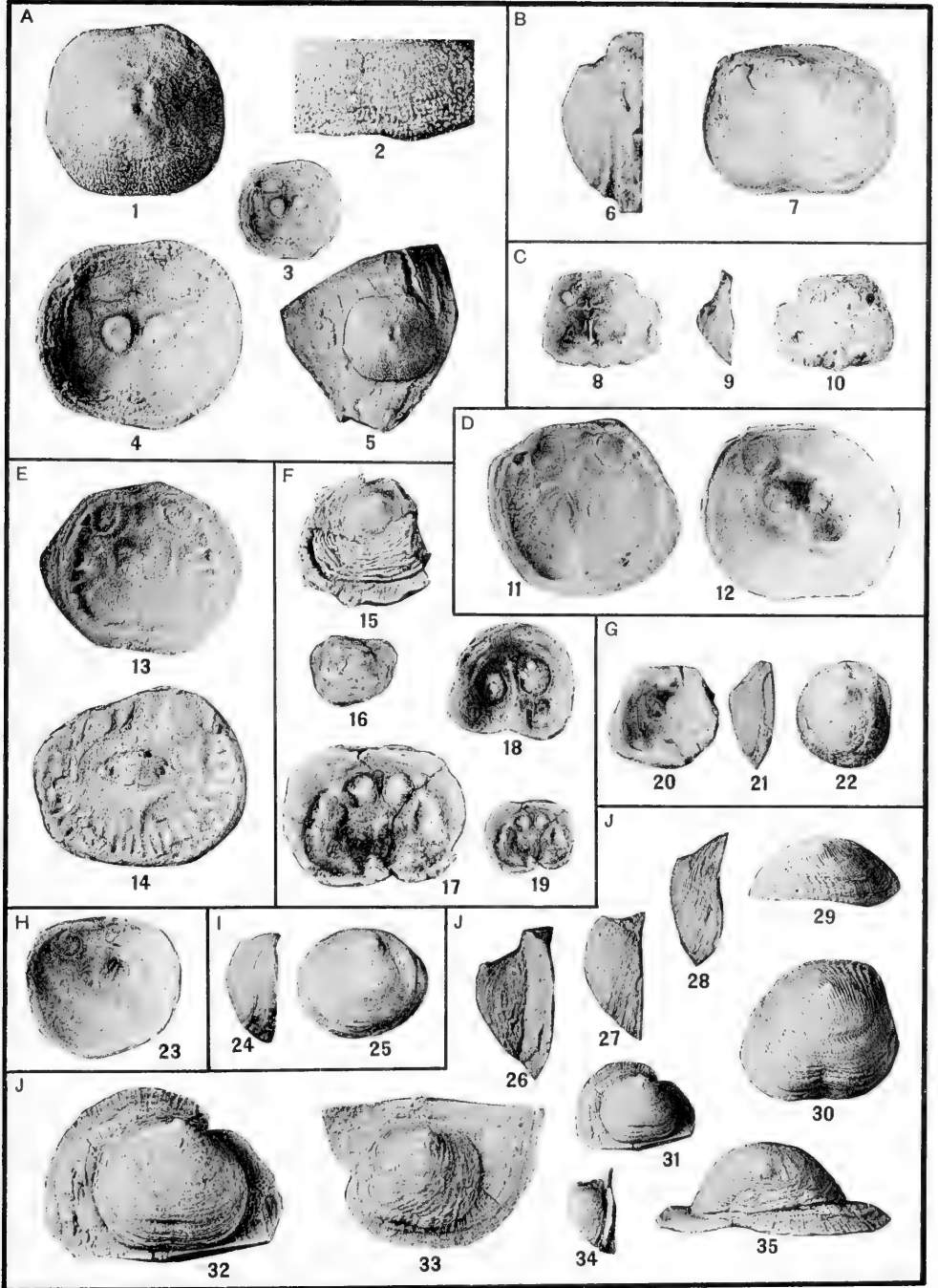
ACROTRETA, CRANIOPS, OBOLELLINA, OBOLUS, PETROCRANIA, PHILHEDRA,  
 SCHIZAMBON, SCHIZOTRETA  
 (SEE EXPLANATION OF PLATES.)



ELLIPTOGLOSSA, LINGULOPS  
(SEE EXPLANATION OF PLATES.)

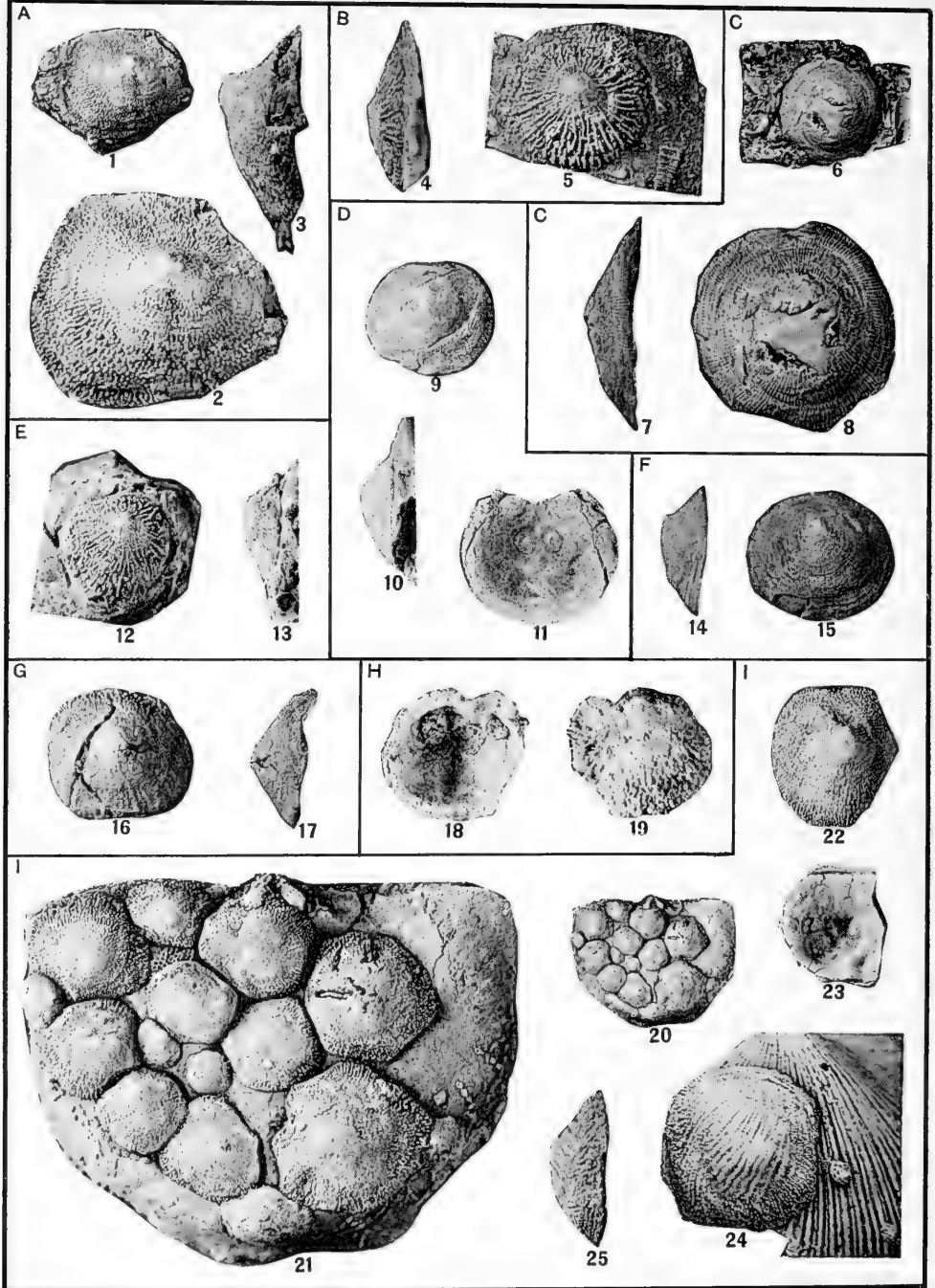


ELLIPTOGLOSSA, OBOLELLINA, PATERULA, PSEUDOBOLUS  
(SEE EXPLANATION OF PLATES.)



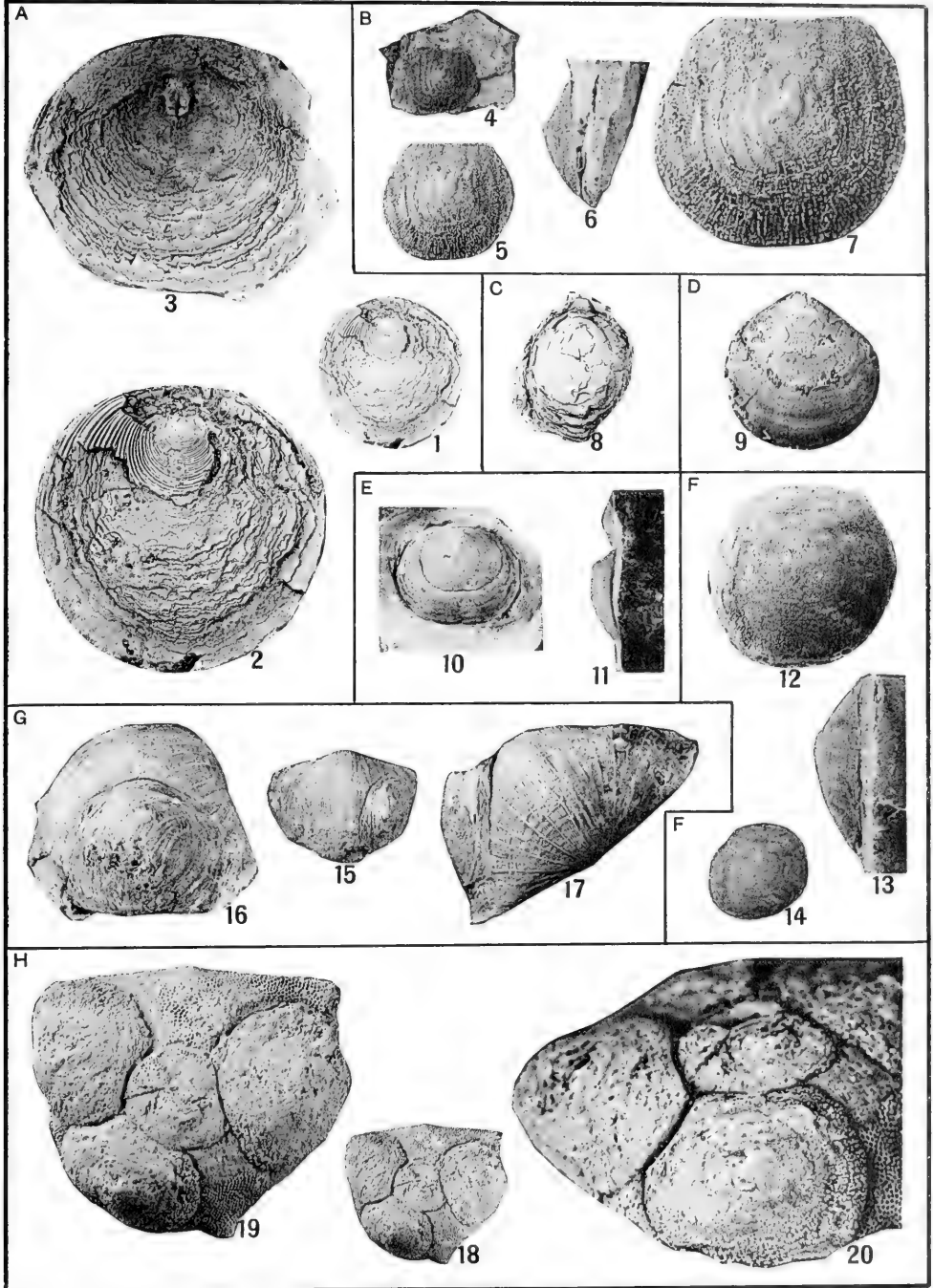
ACANTHOCRANIA, PETROCRANIA

(SEE EXPLANATION OF PLATES.)

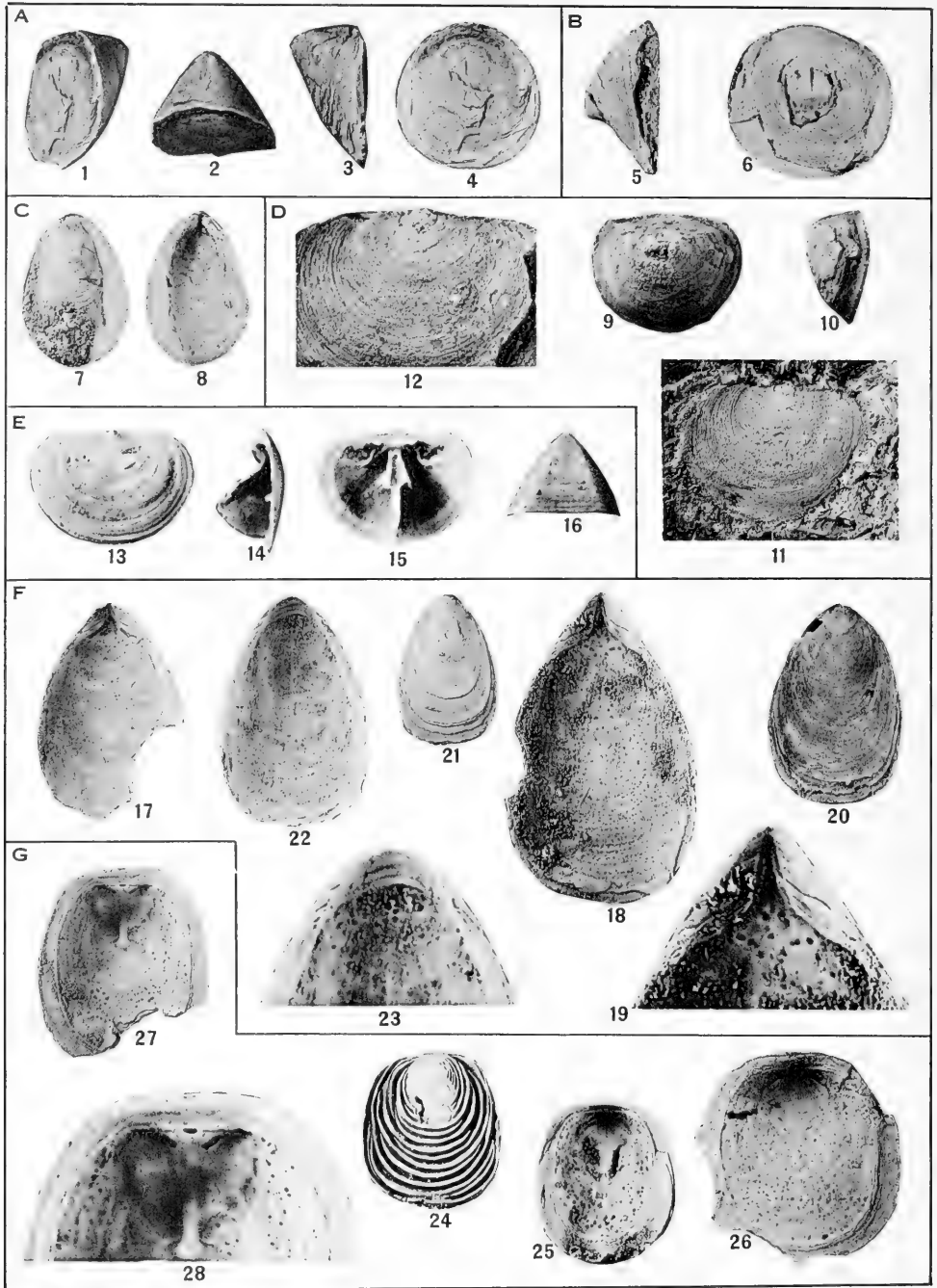


ACANTHOCRANIA, PETROCRANIA, PHILHEDRA

(SEE EXPLANATION OF PLATES.)



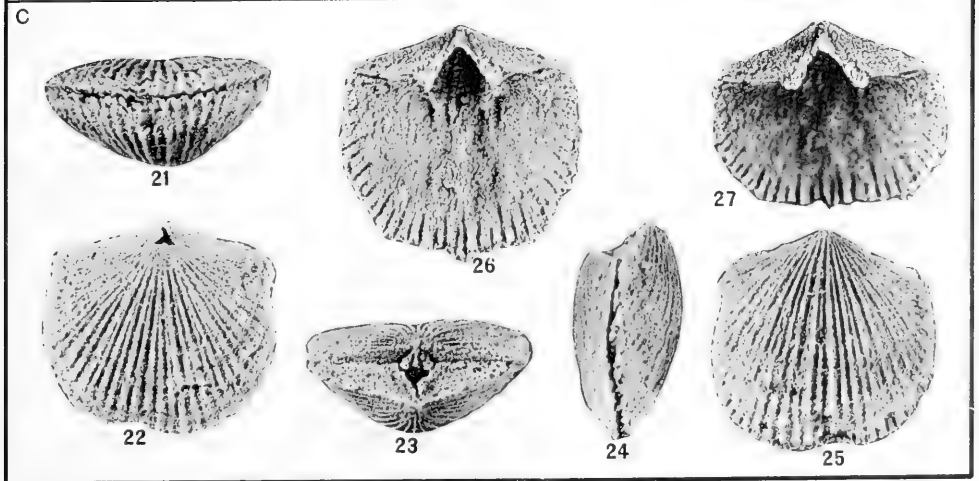
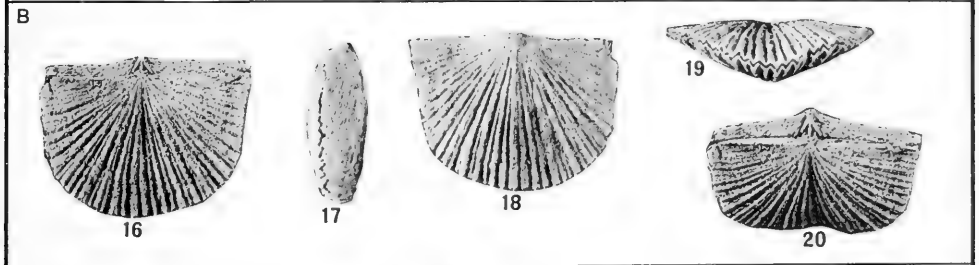
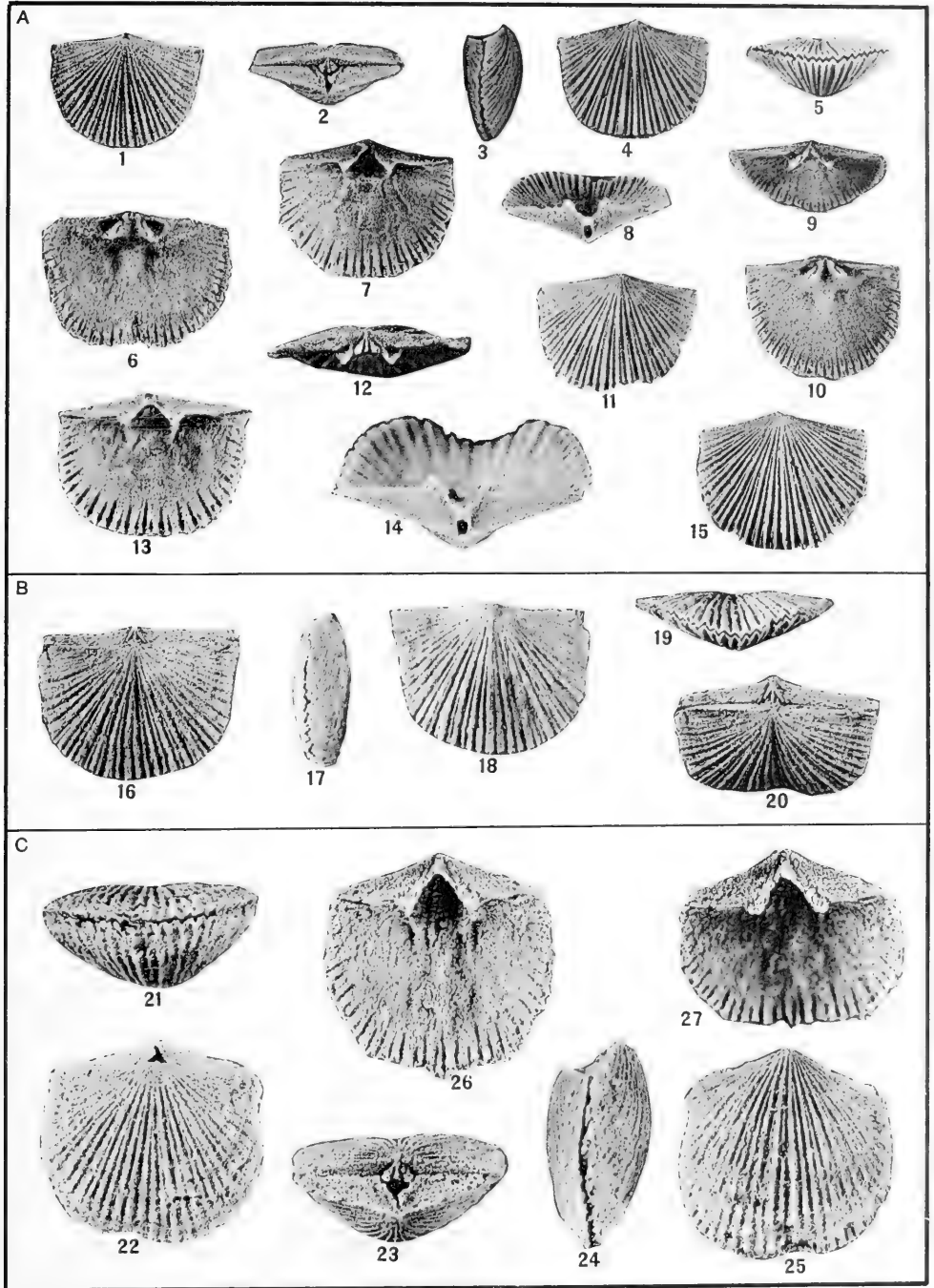
ACANTHOCRANIA, PACHYGLOSSA, PETROCRANIA, SCHIZOTRETA, TREMATIS  
(SEE EXPLANATION OF PLATES.)



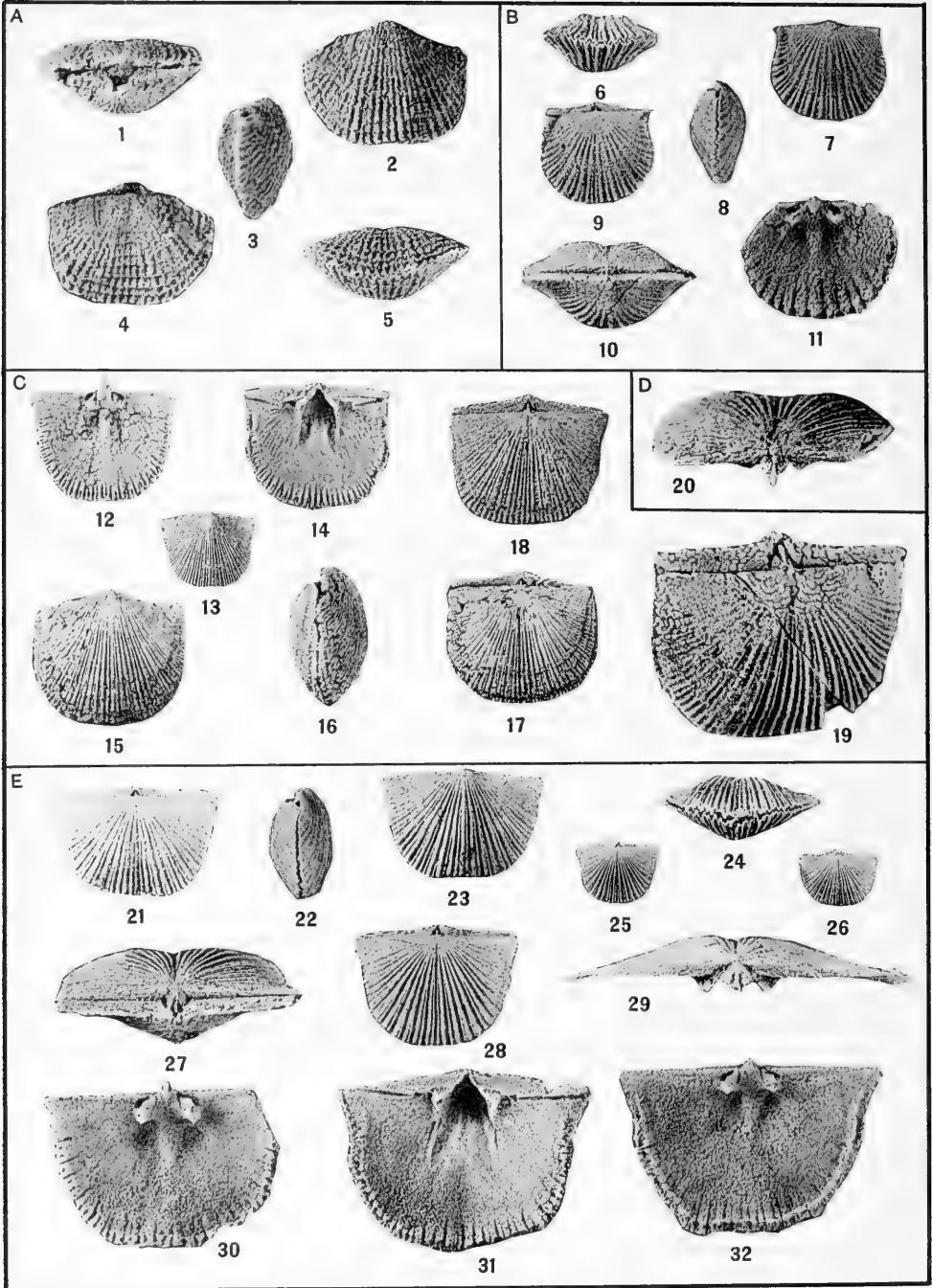
ACROTRETA, CONOTRETA, LINGULELLA, PACHYGLOSSA, SCHIZOTRETA,  
TORYNELASMA

(SEE EXPLANATION OF PLATES.)

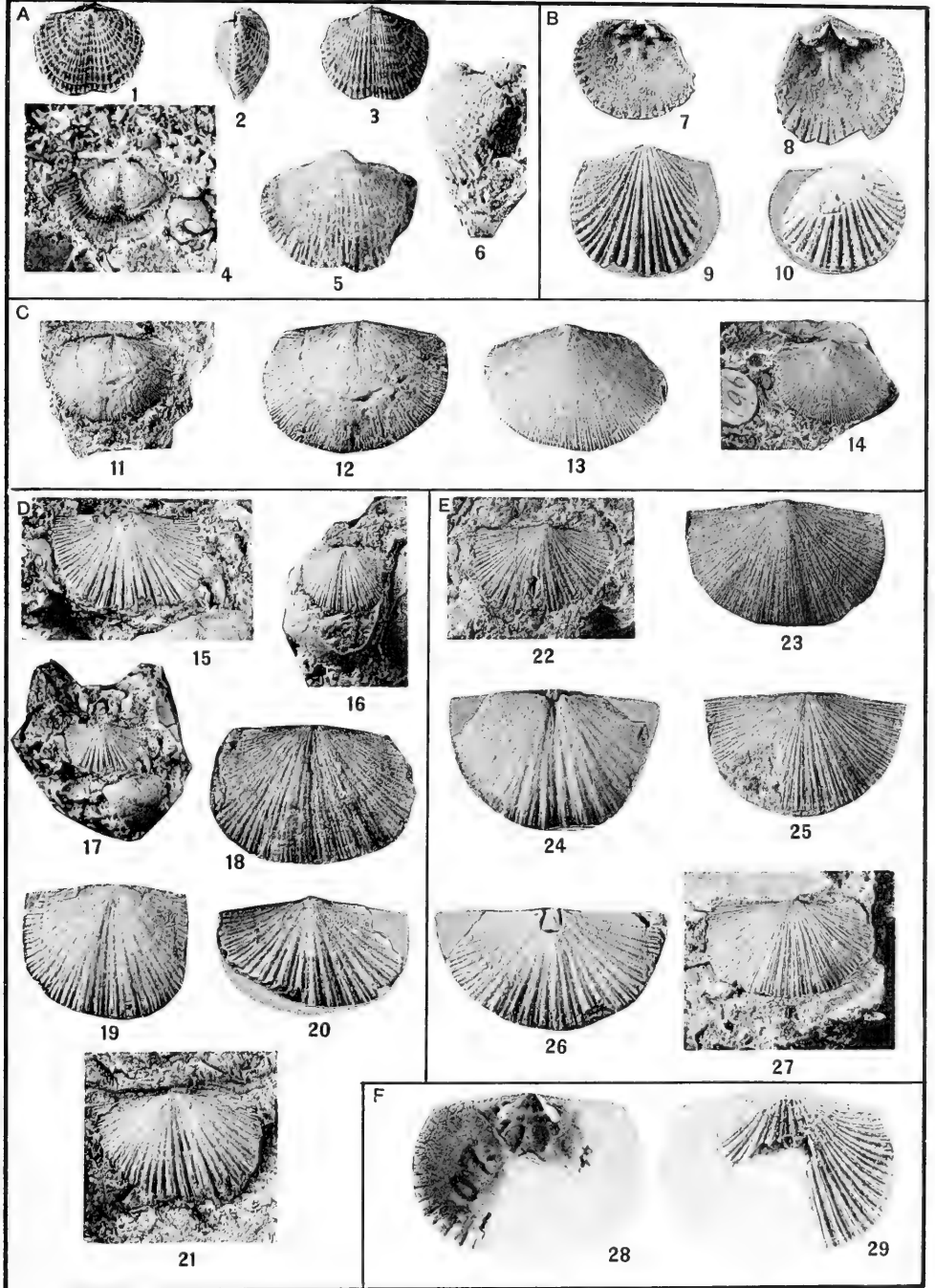




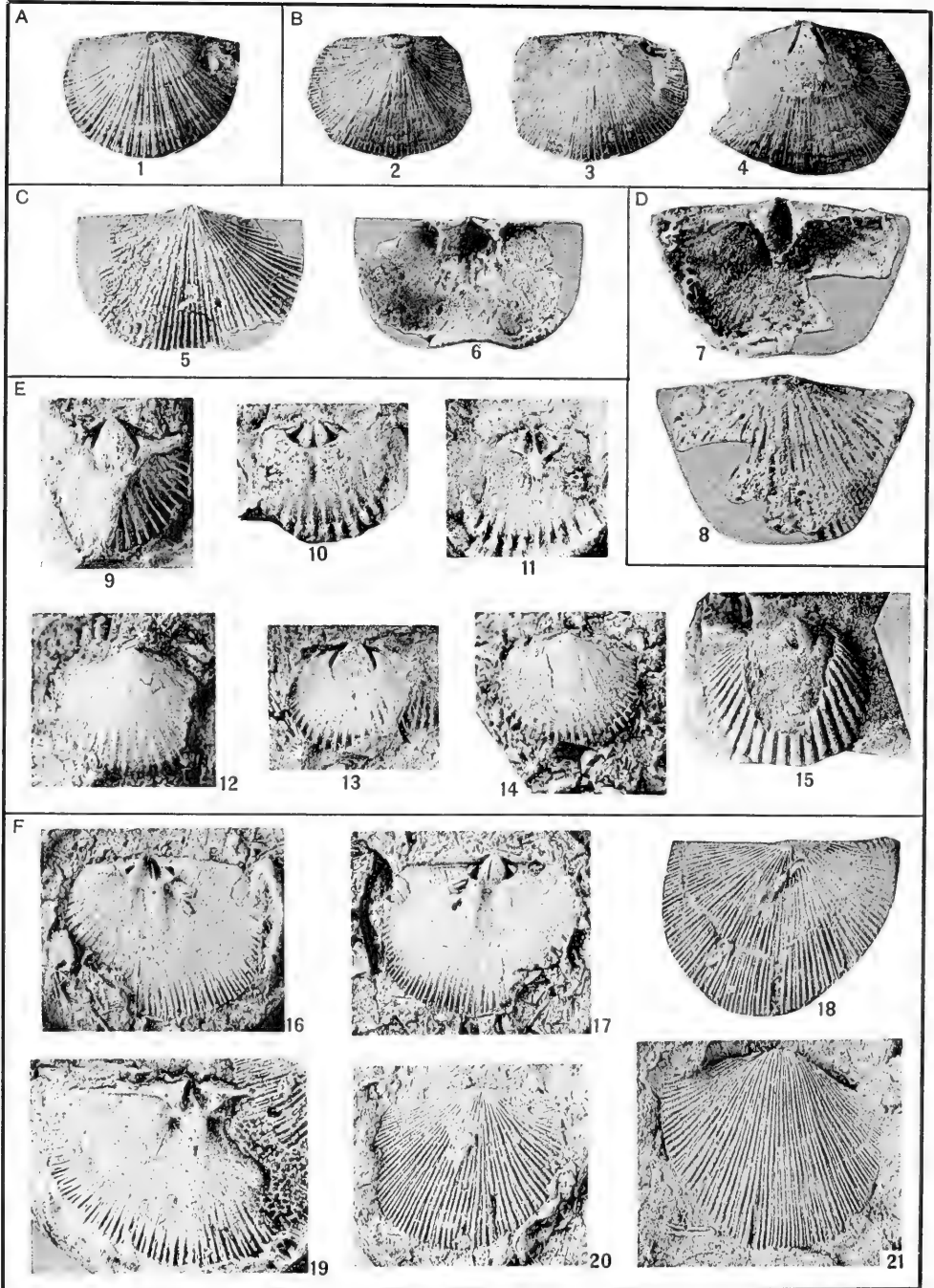
ORTHIDIELLA, TREMATORTHIS  
(SEE EXPLANATION OF PLATES.)



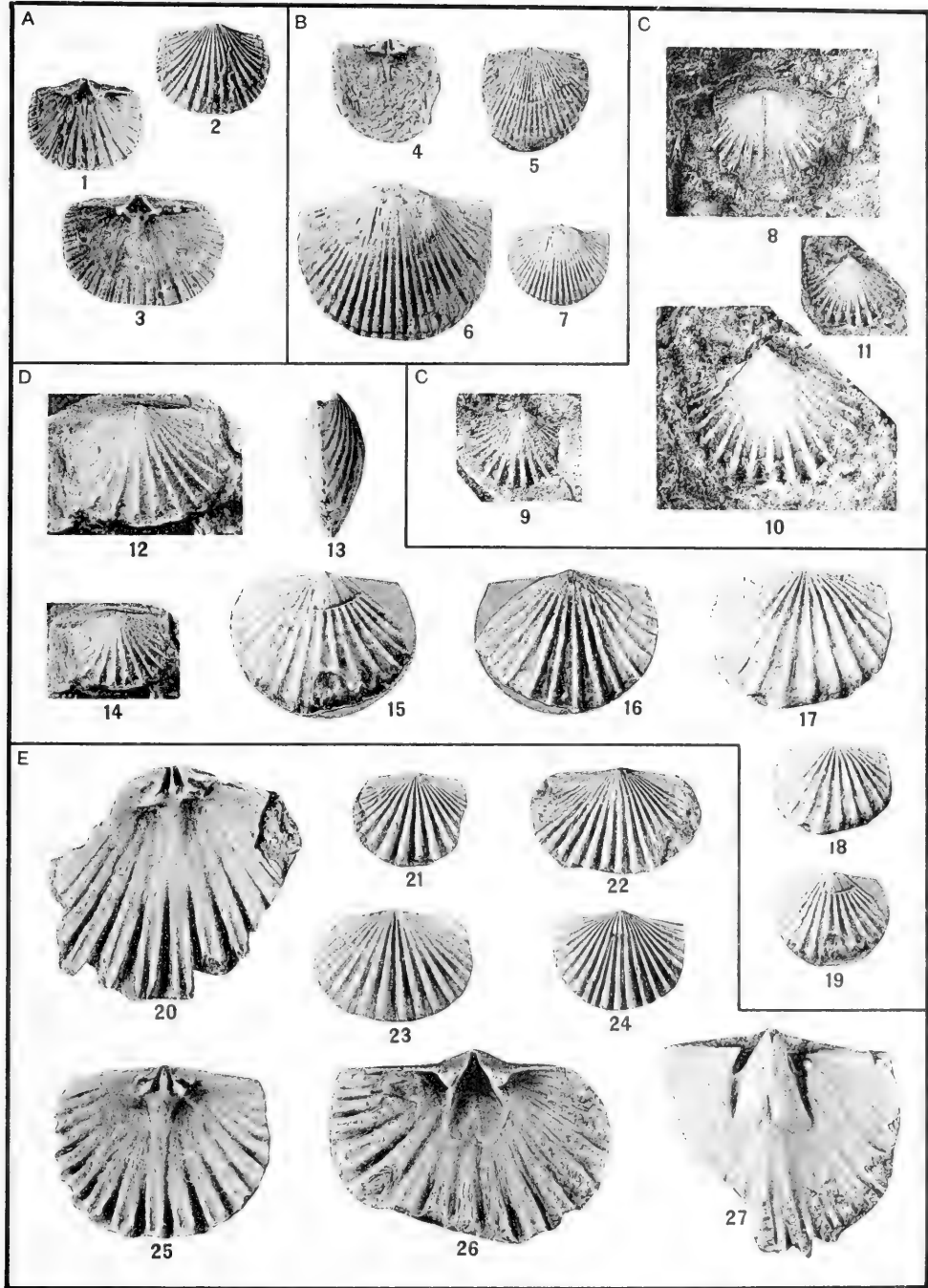
ORTHIDIELLA, ORTHIDIUM  
(SEE EXPLANATION OF PLATES.)



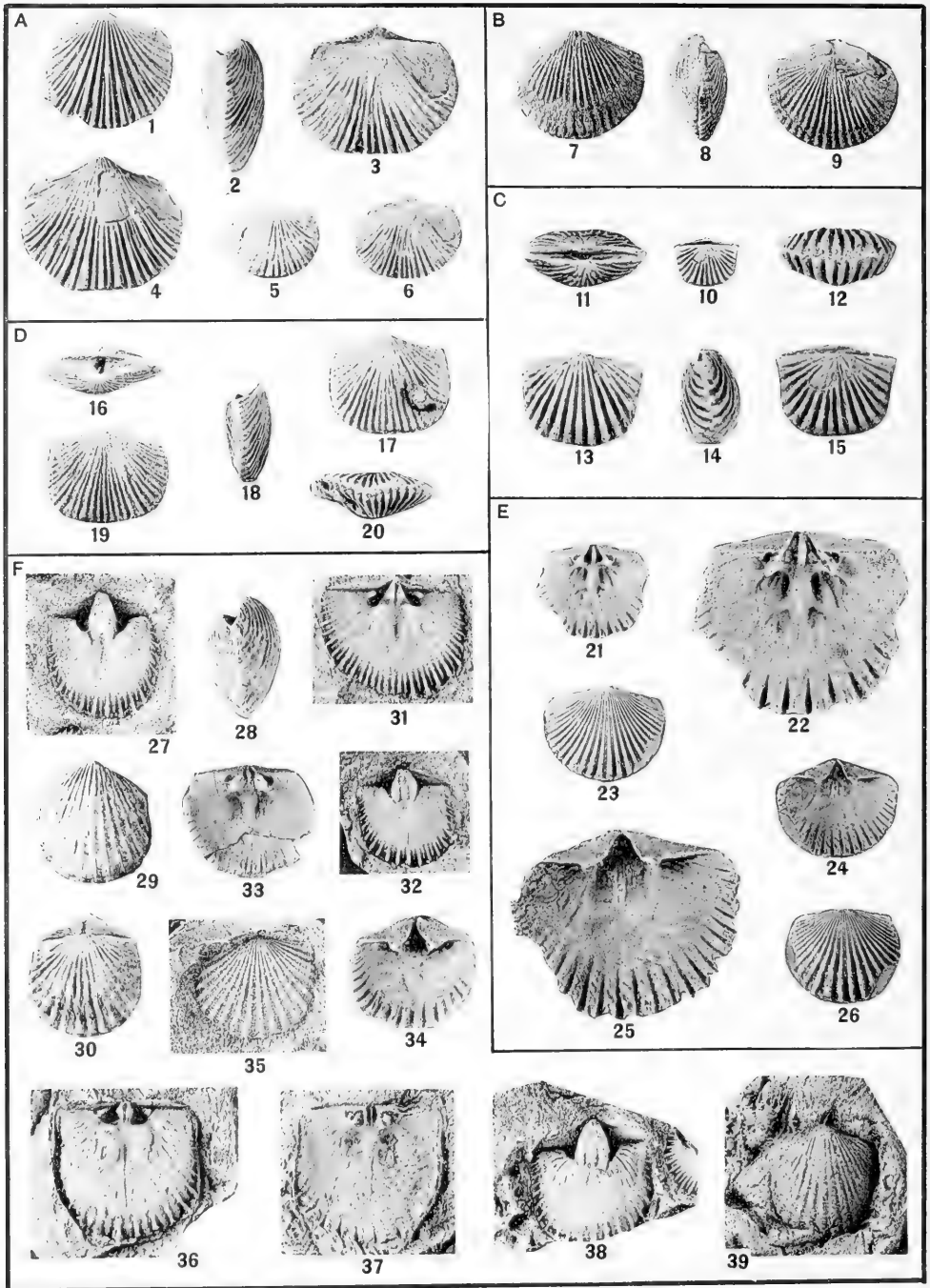
ARCHAEORTHIS, ORTHIDIUM, PLEURORTHIS  
(SEE EXPLANATION OF PLATES.)



CYRTONOTELLA, HESPERORTHIS, PLEURORTHIS, RHYSTOSTROPHIA  
(SEE EXPLANATION OF PLATES.)

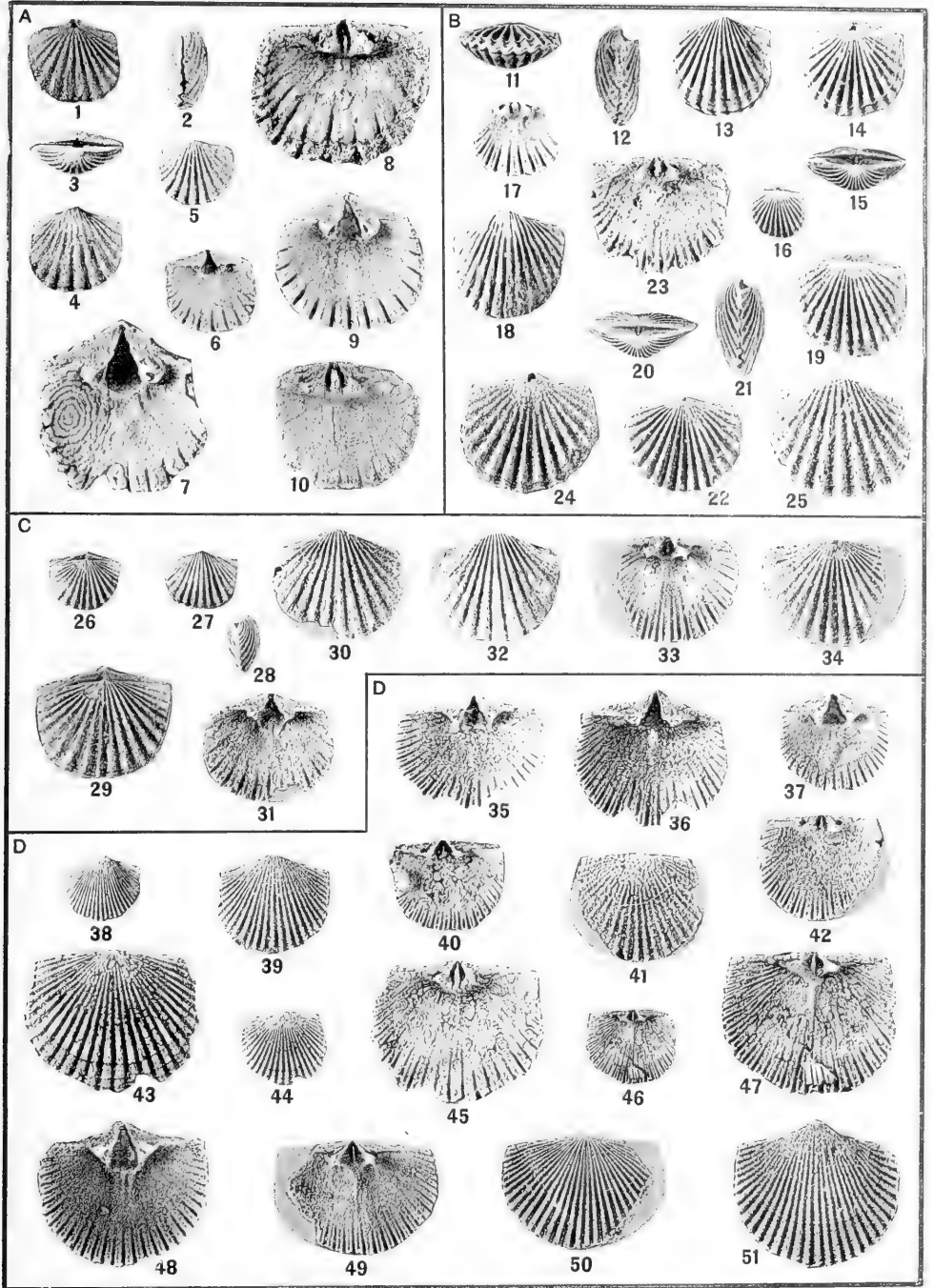


ORTHAMBONITES  
(SEE EXPLANATION OF PLATES.)



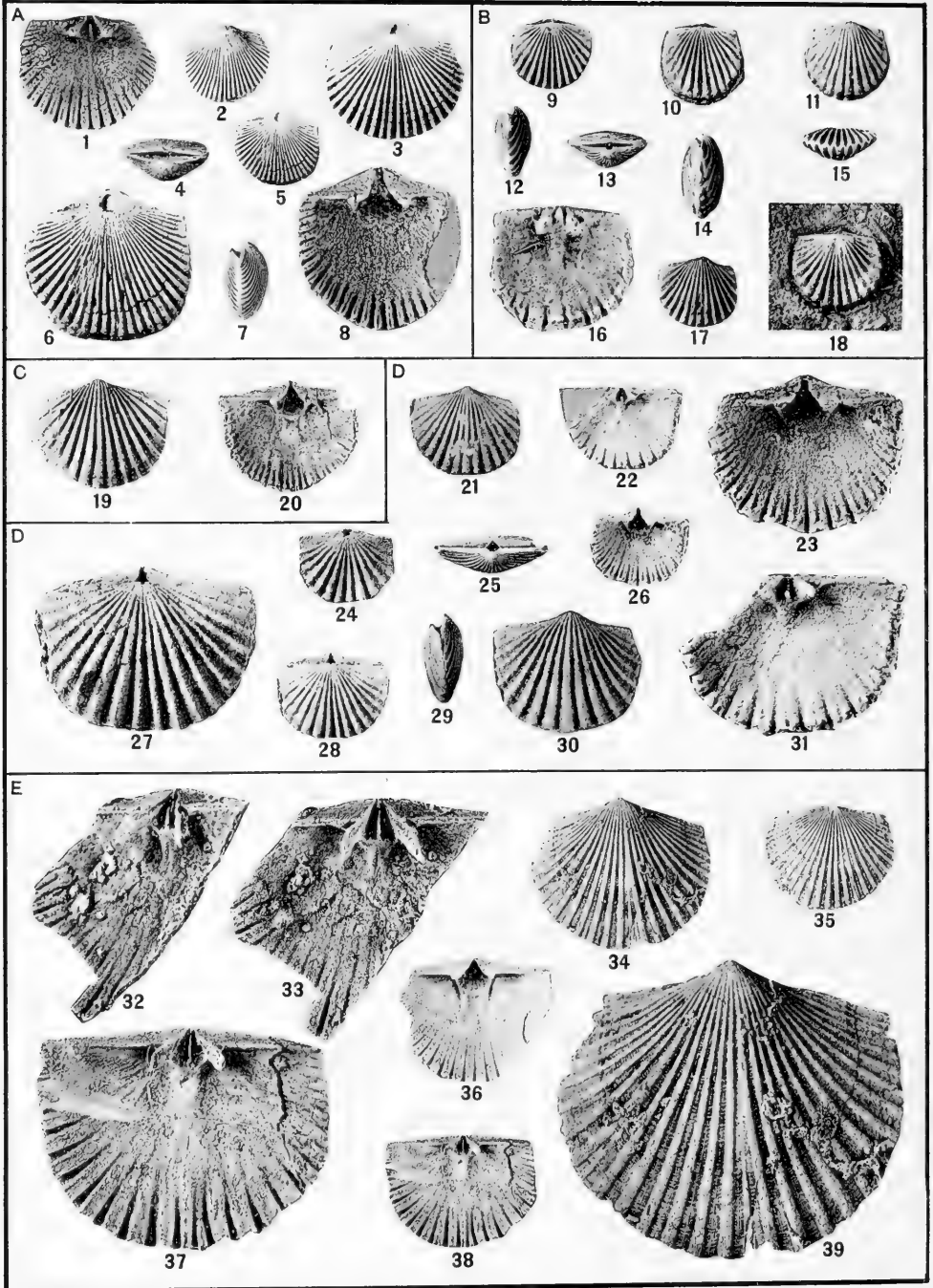
ORTHAMBONITES

(SEE EXPLANATION OF PLATES.)



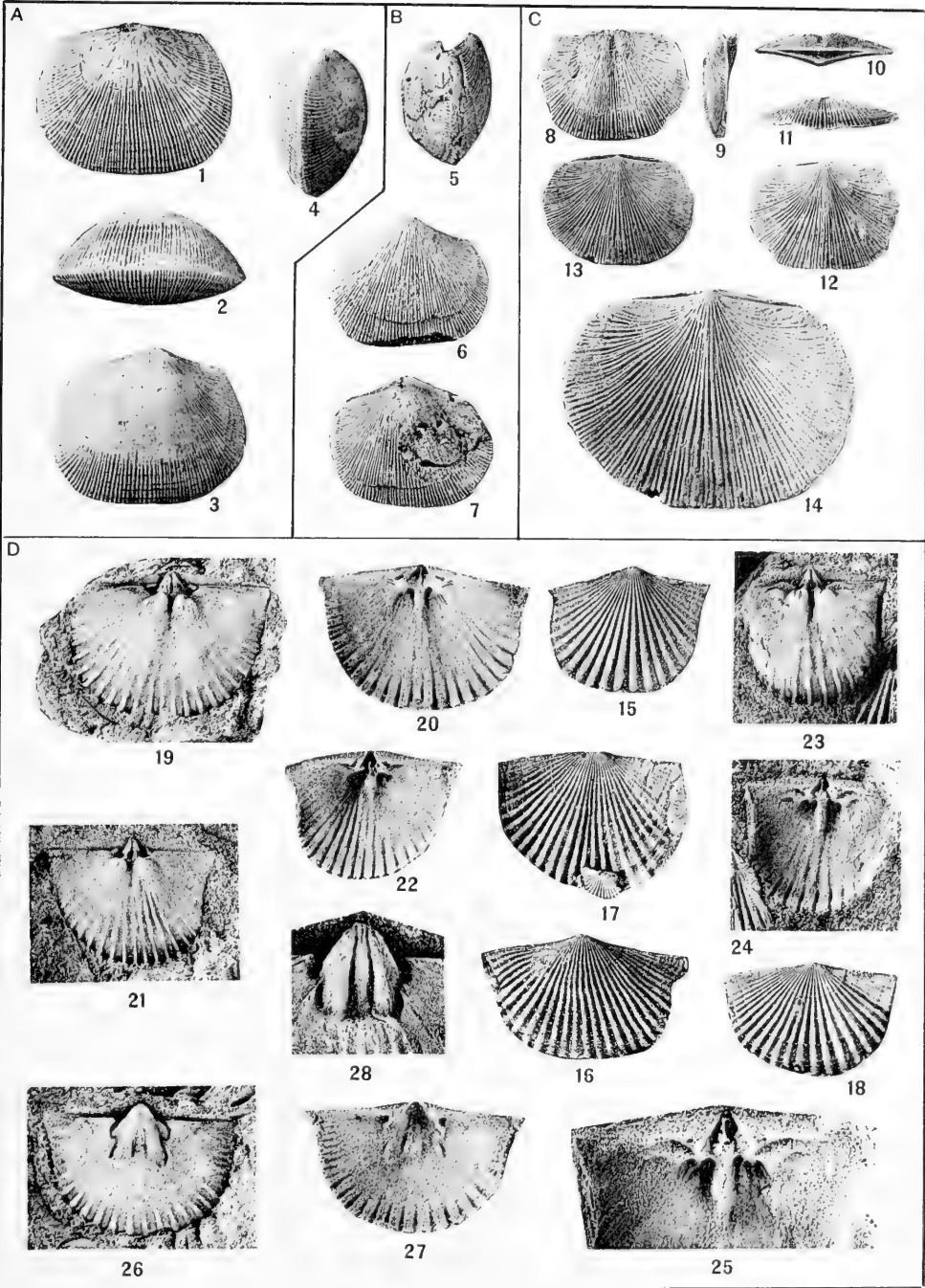
ORTHAMBONITES

(SEE EXPLANATION OF PLATES.)



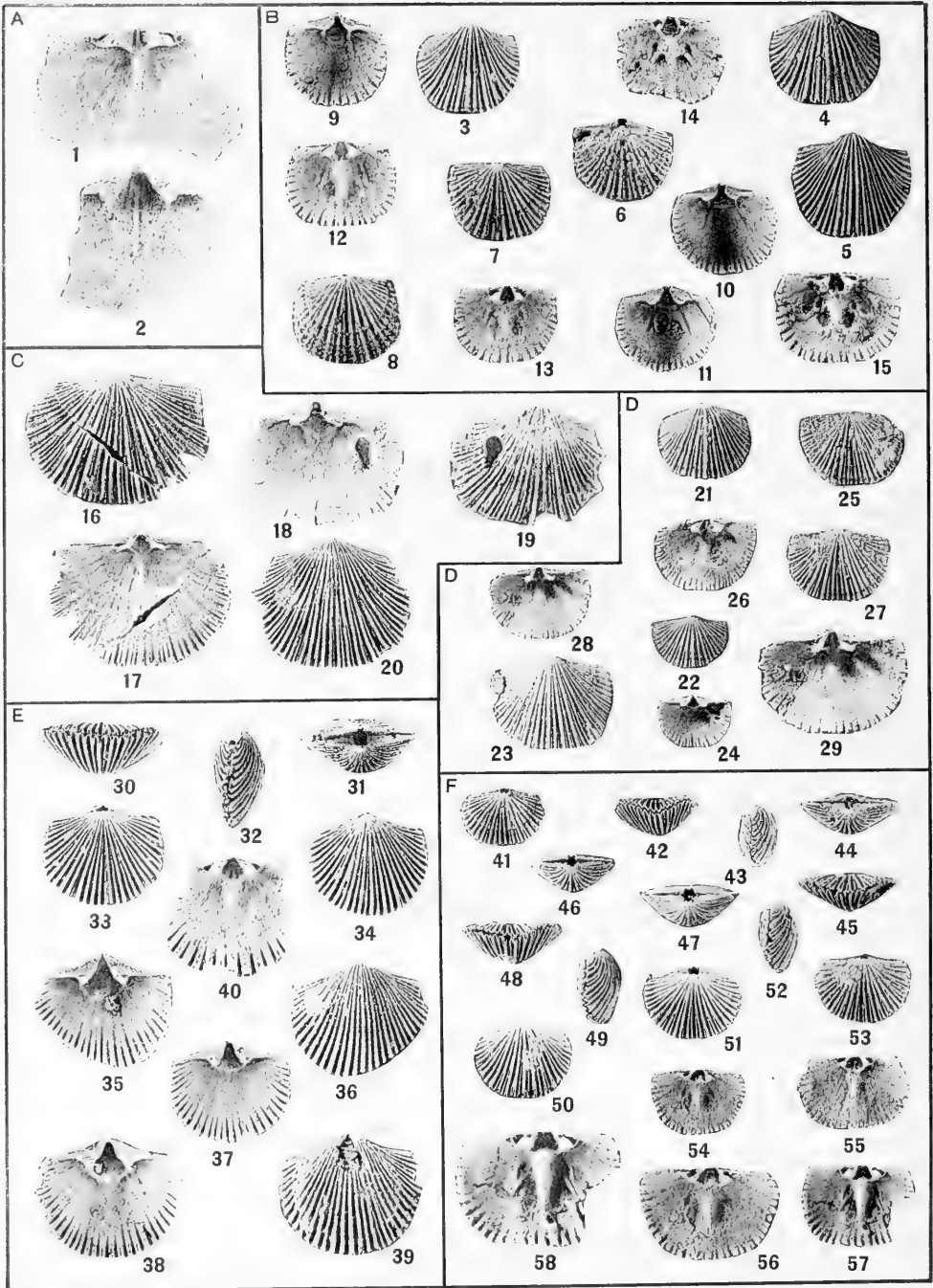
ORTHAMBONITES  
(SEE EXPLANATION OF PLATES.)





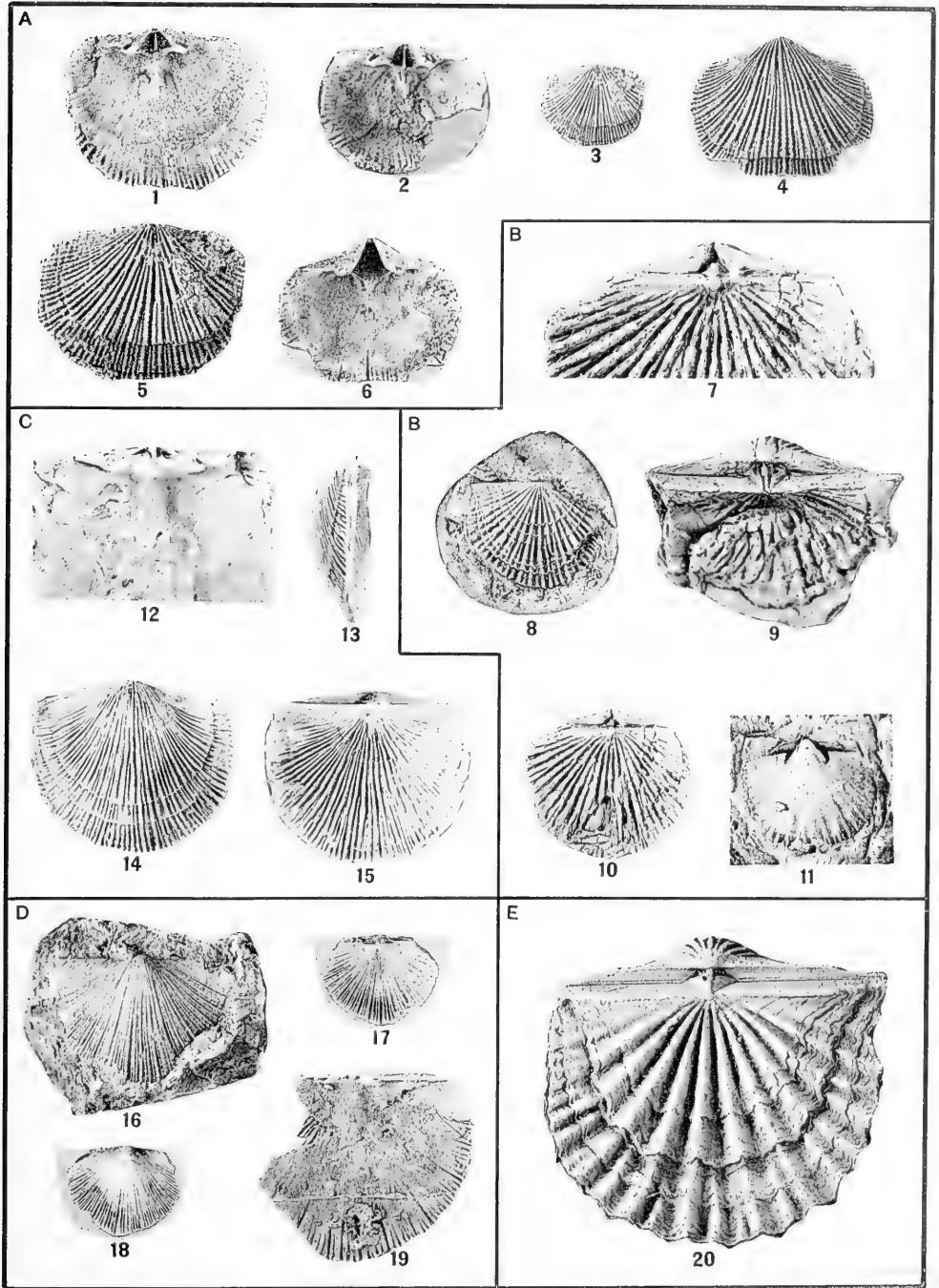
MIMELLA, ONNIELLA, ORTHAMBONITES

(SEE EXPLANATION OF PLATES.)

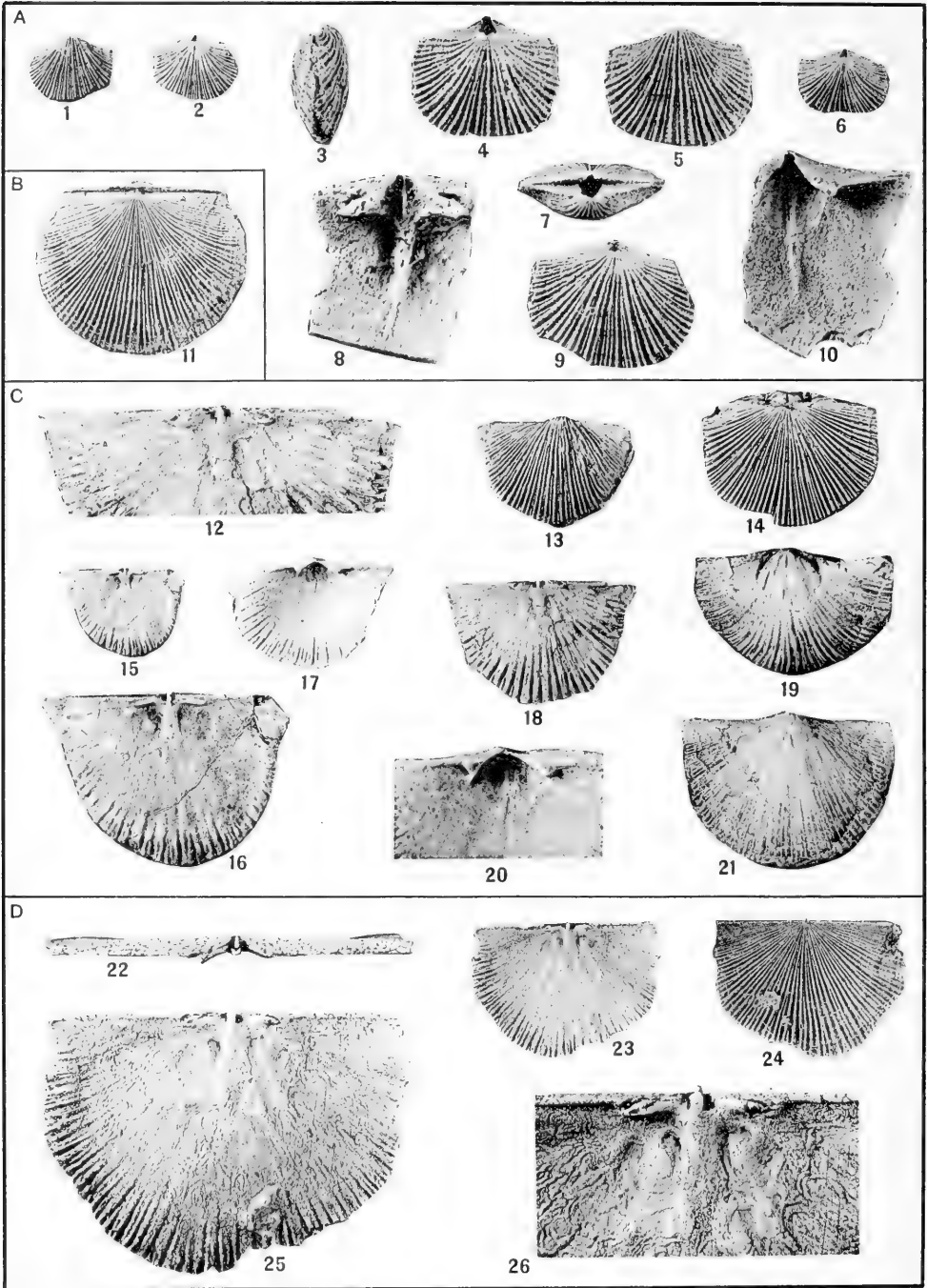


NOTHORTHIS, ORTHAMBONITES, TAPHRORTHIS

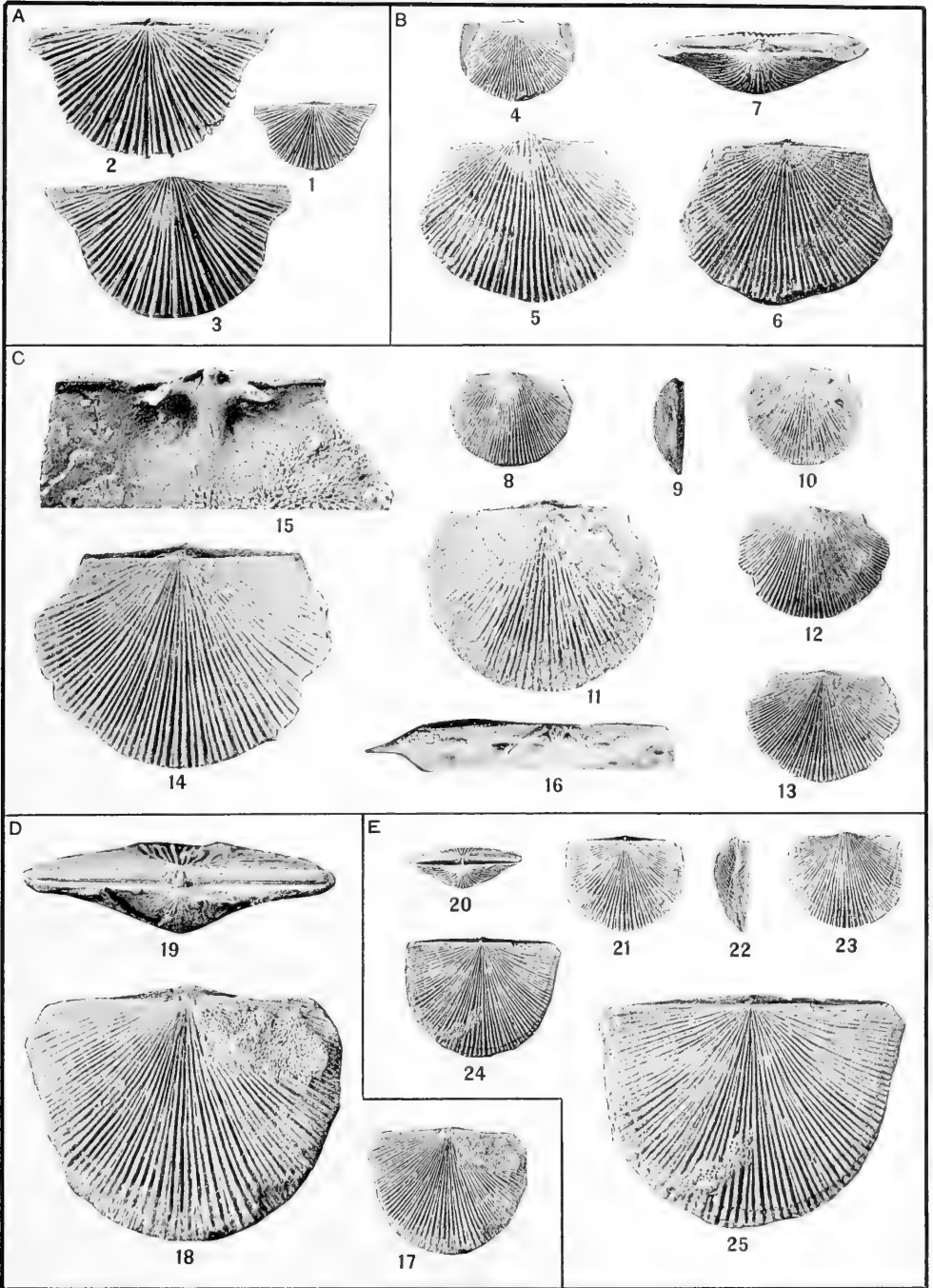
(SEE EXPLANATION OF PLATES.)



CYRTONOTELLA, NICOLELLA, TAPHRORTHIS  
(SEE EXPLANATION OF PLATES.)

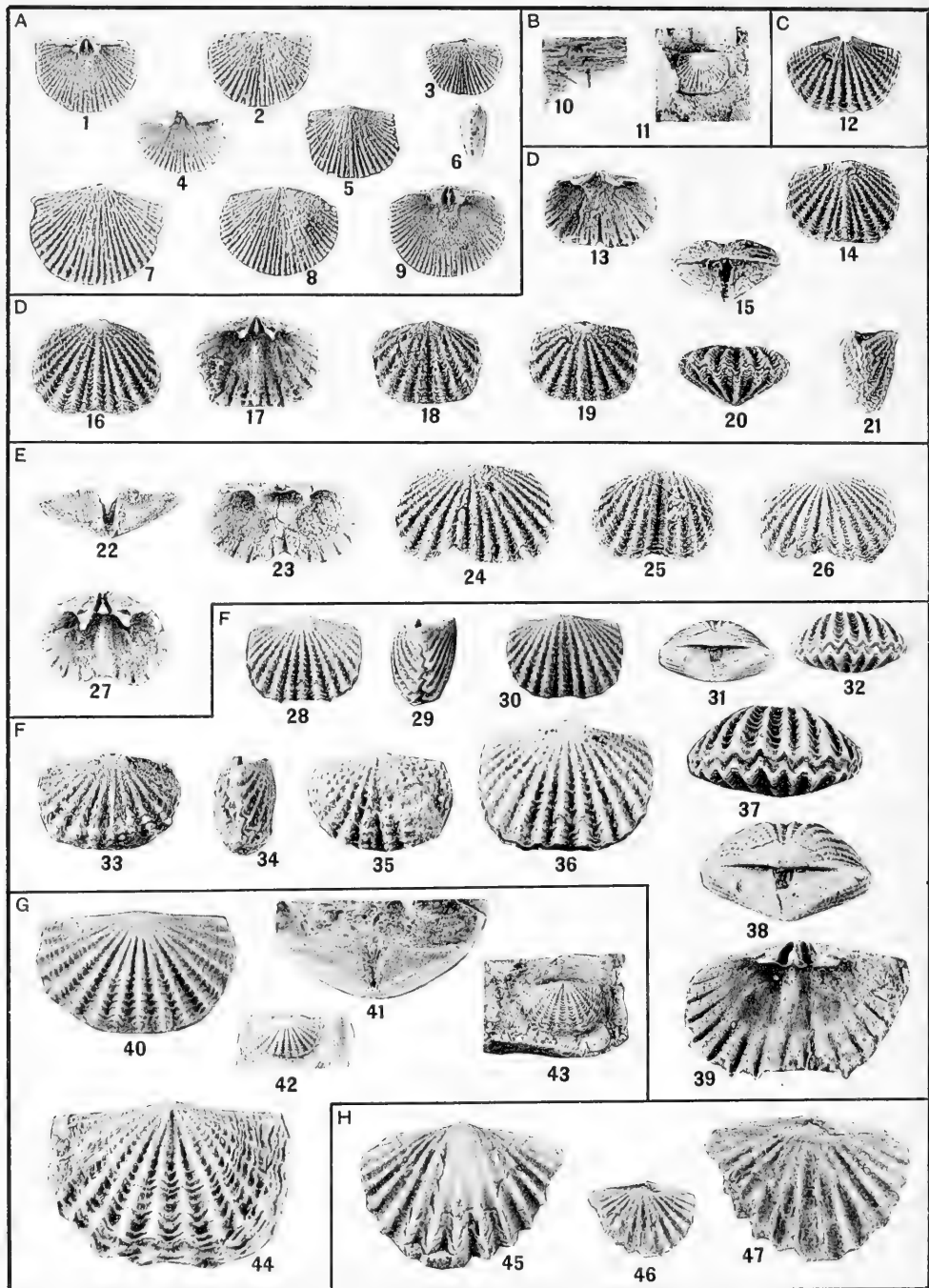


CYRTONOTELLA, TAPHRORTHIS  
(SEE EXPLANATION OF PLATES.)



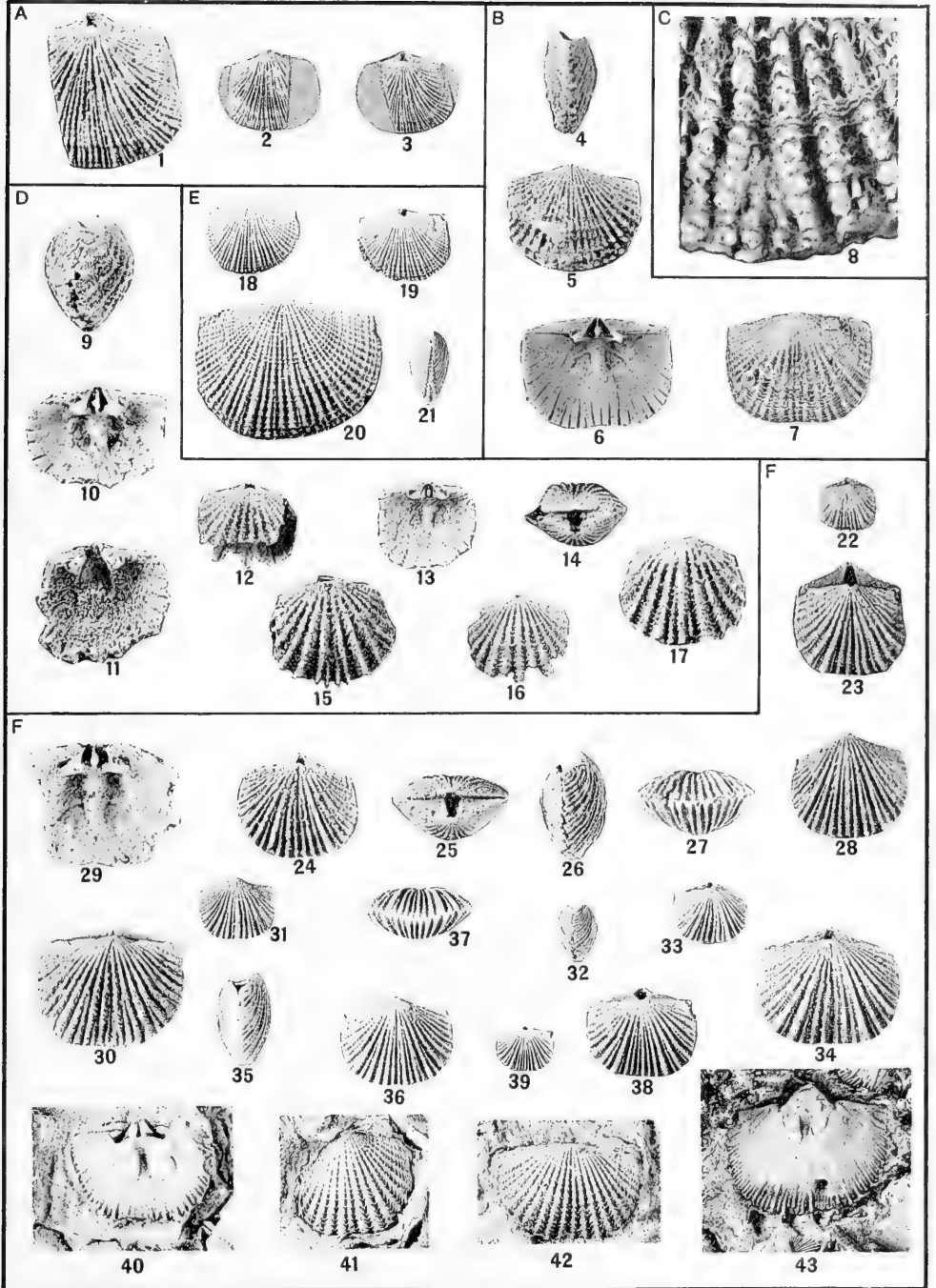
CYRTONOTELLA

(SEE EXPLANATION OF PLATES.)



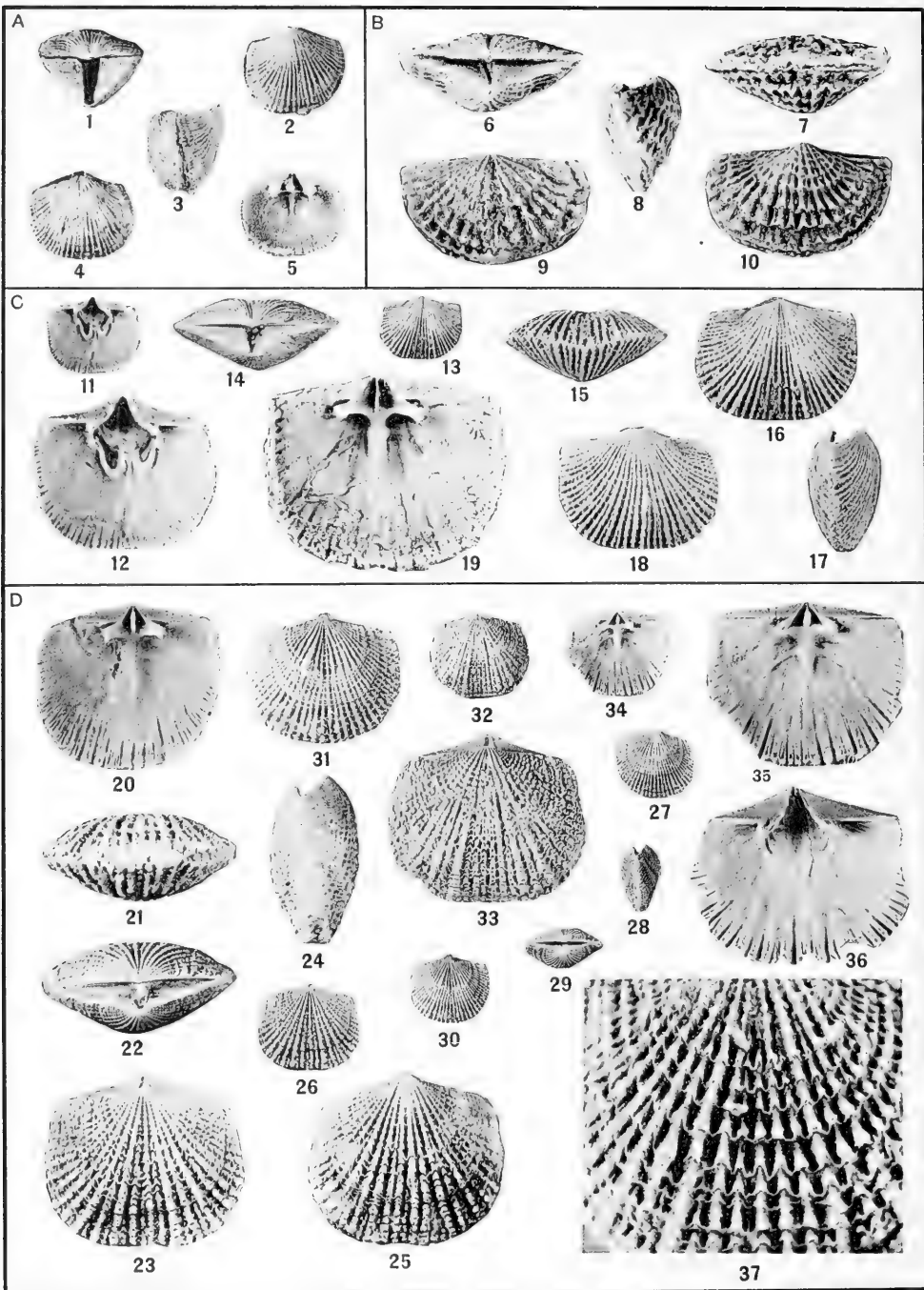
NICOLELLA, ORTHAMBONITES, PTYCHOPLEURELLA

(SEE EXPLANATION OF PLATES.)



GLYPTORTHIS, PTYCHOPLEURELLA

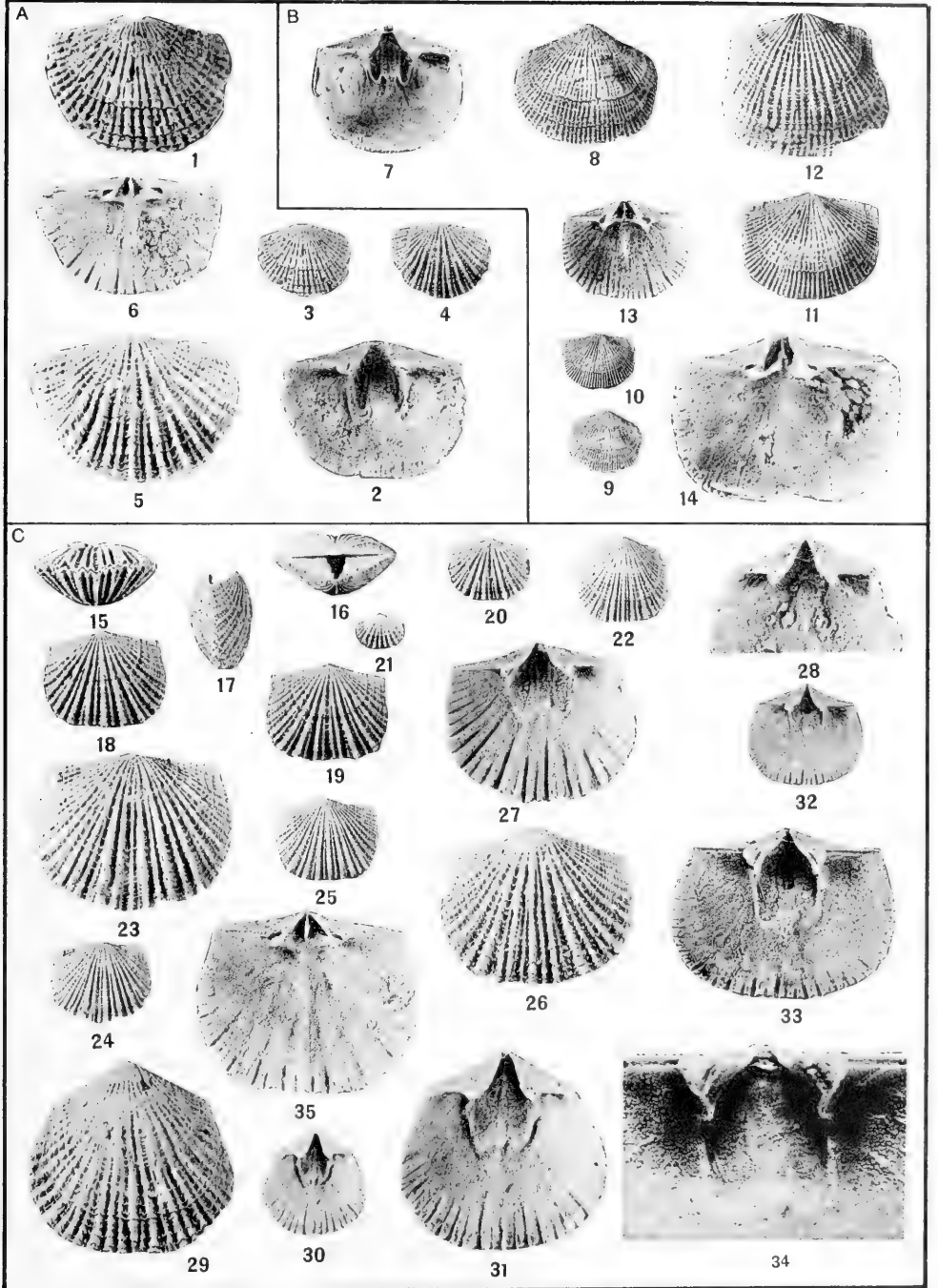
(SEE EXPLANATION OF PLATES.)



GLYPTORTHIS

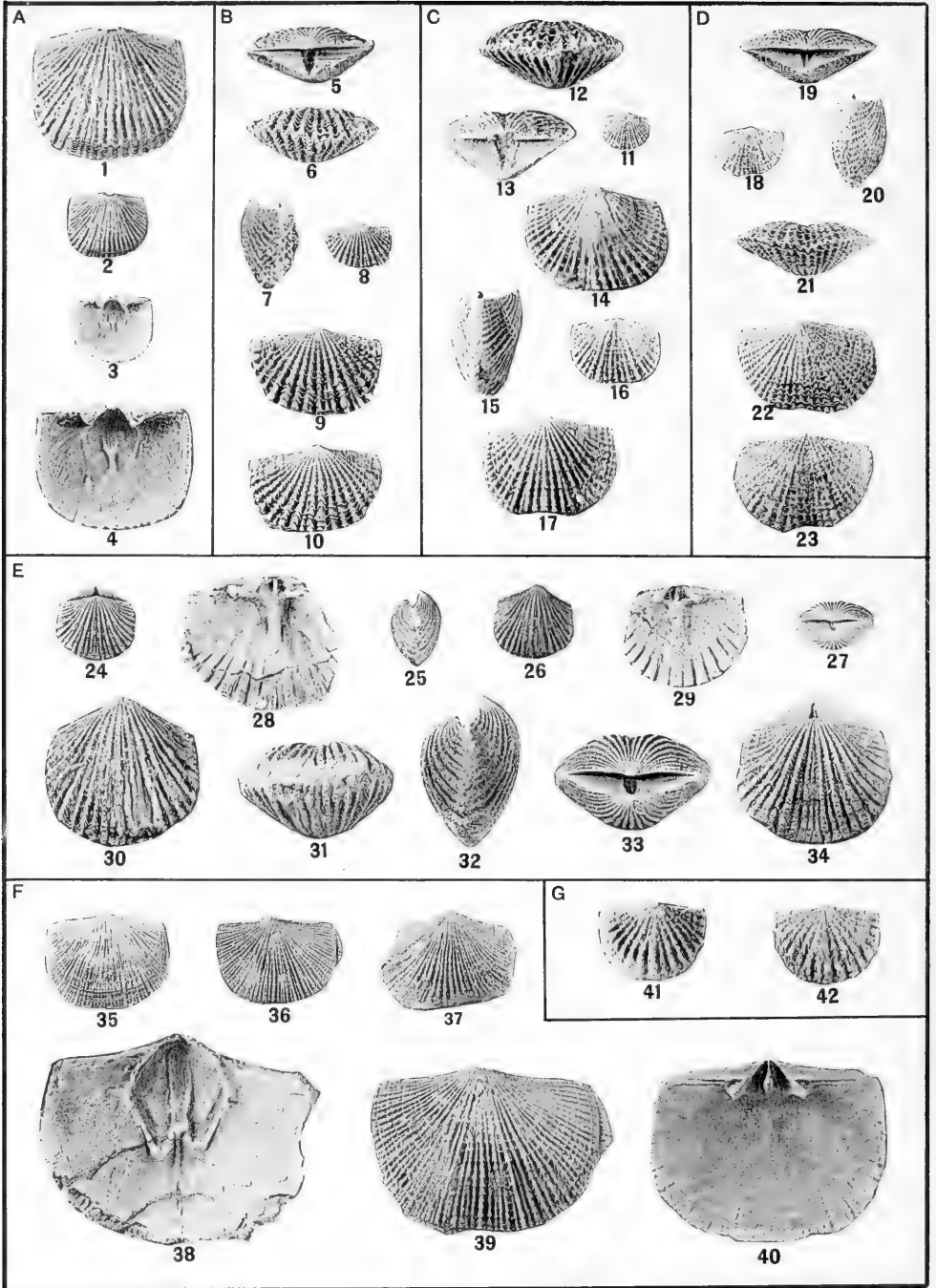
(SEE EXPLANATION OF PLATES.)





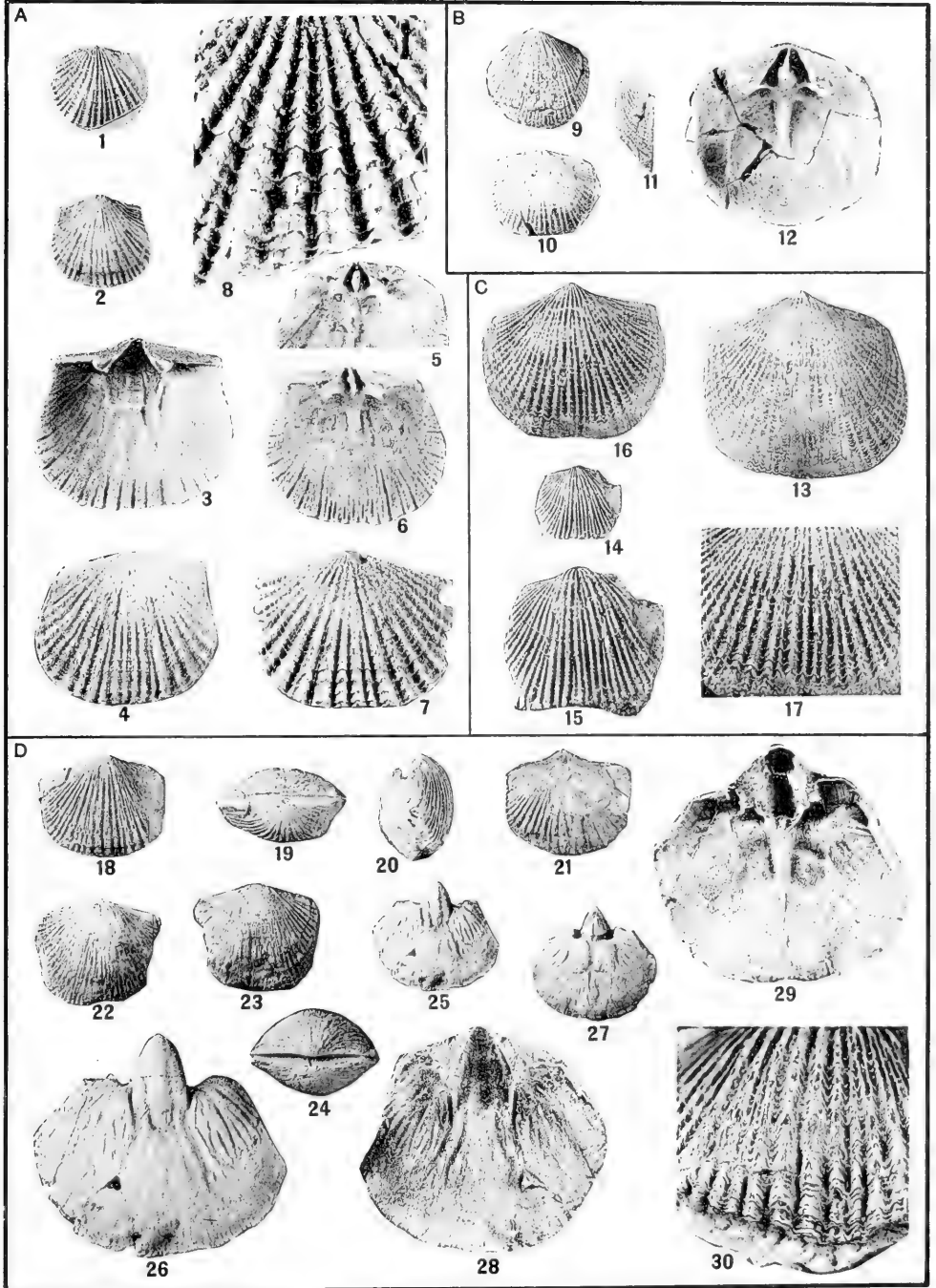
GLYPTORTHIS

(SEE EXPLANATION OF PLATES.)



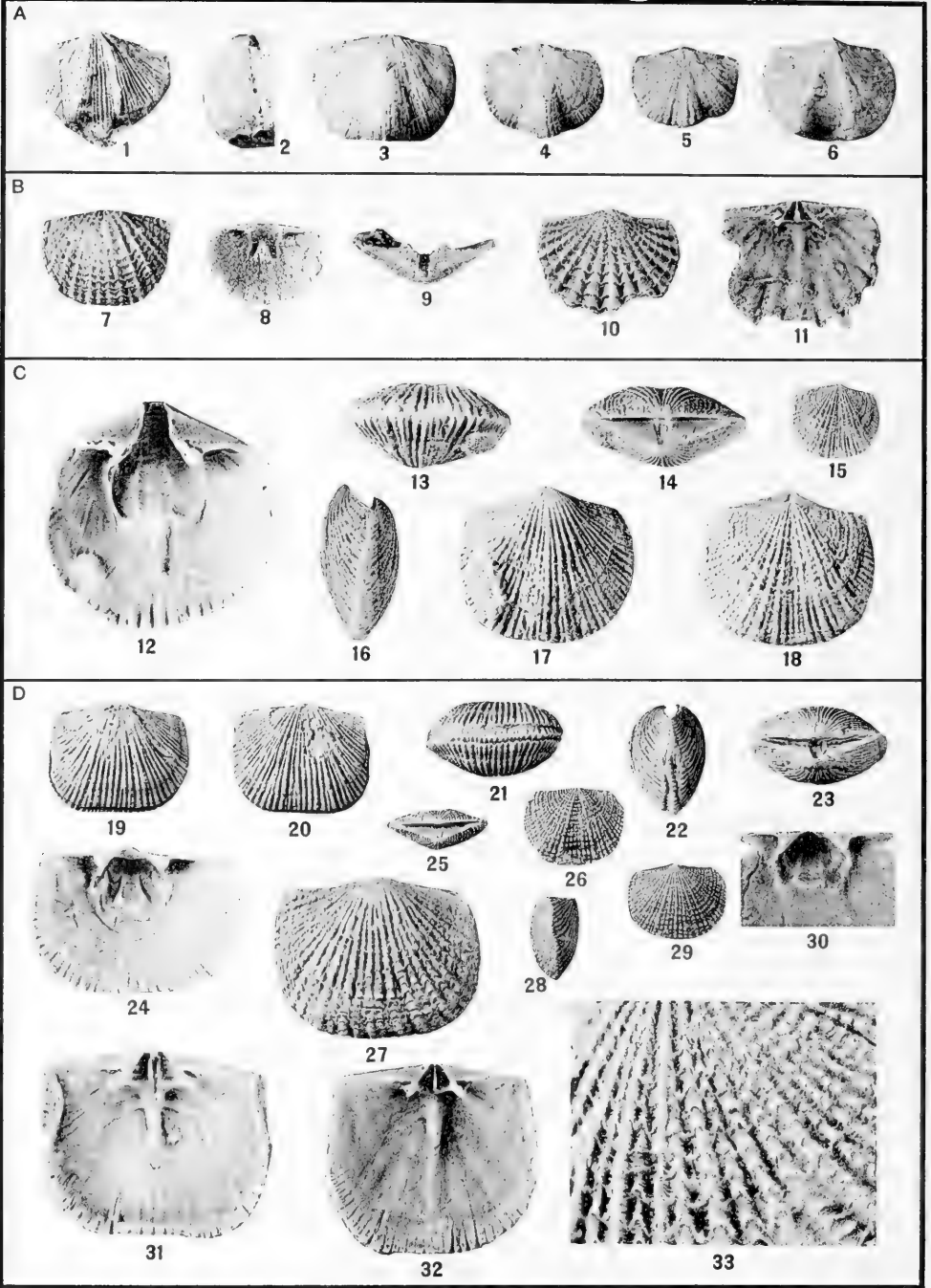
GLYPTORTHIS

(SEE EXPLANATION OF PLATES.)

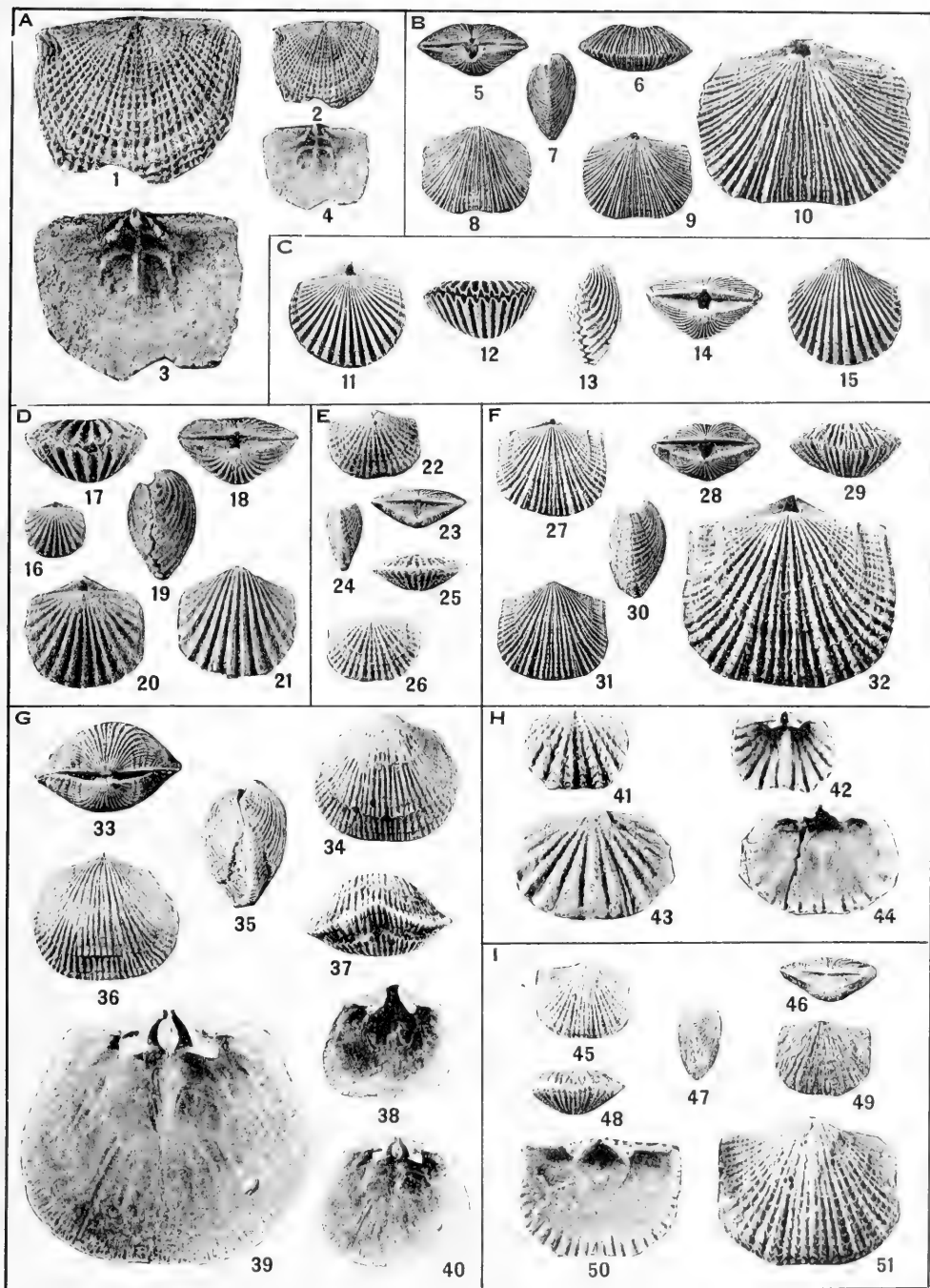


GLYPTORTHIS

(SEE EXPLANATION OF PLATES.)

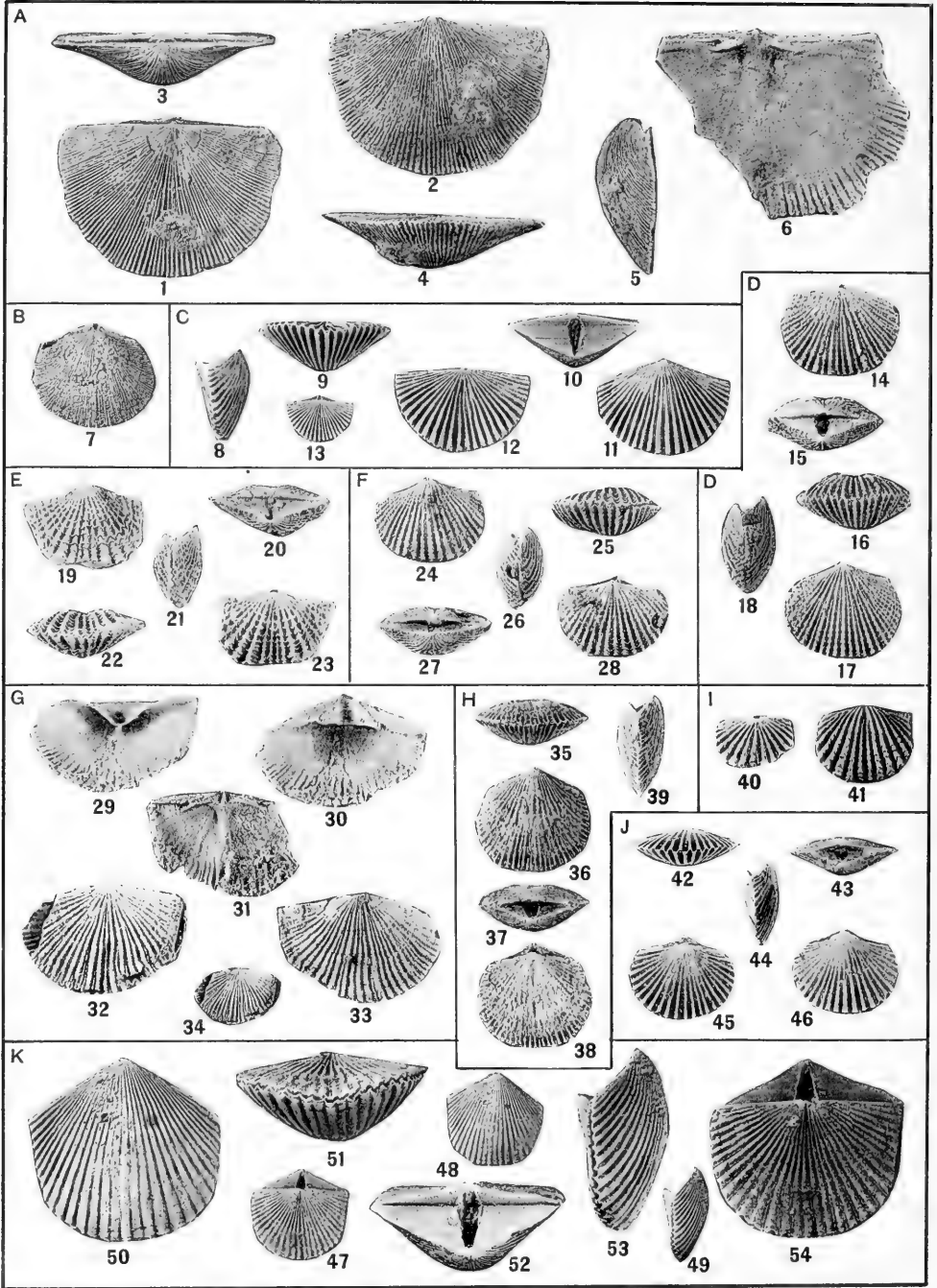


ERIDORTHIS, GLYPTORTHIS  
(SEE EXPLANATION OF PLATES.)



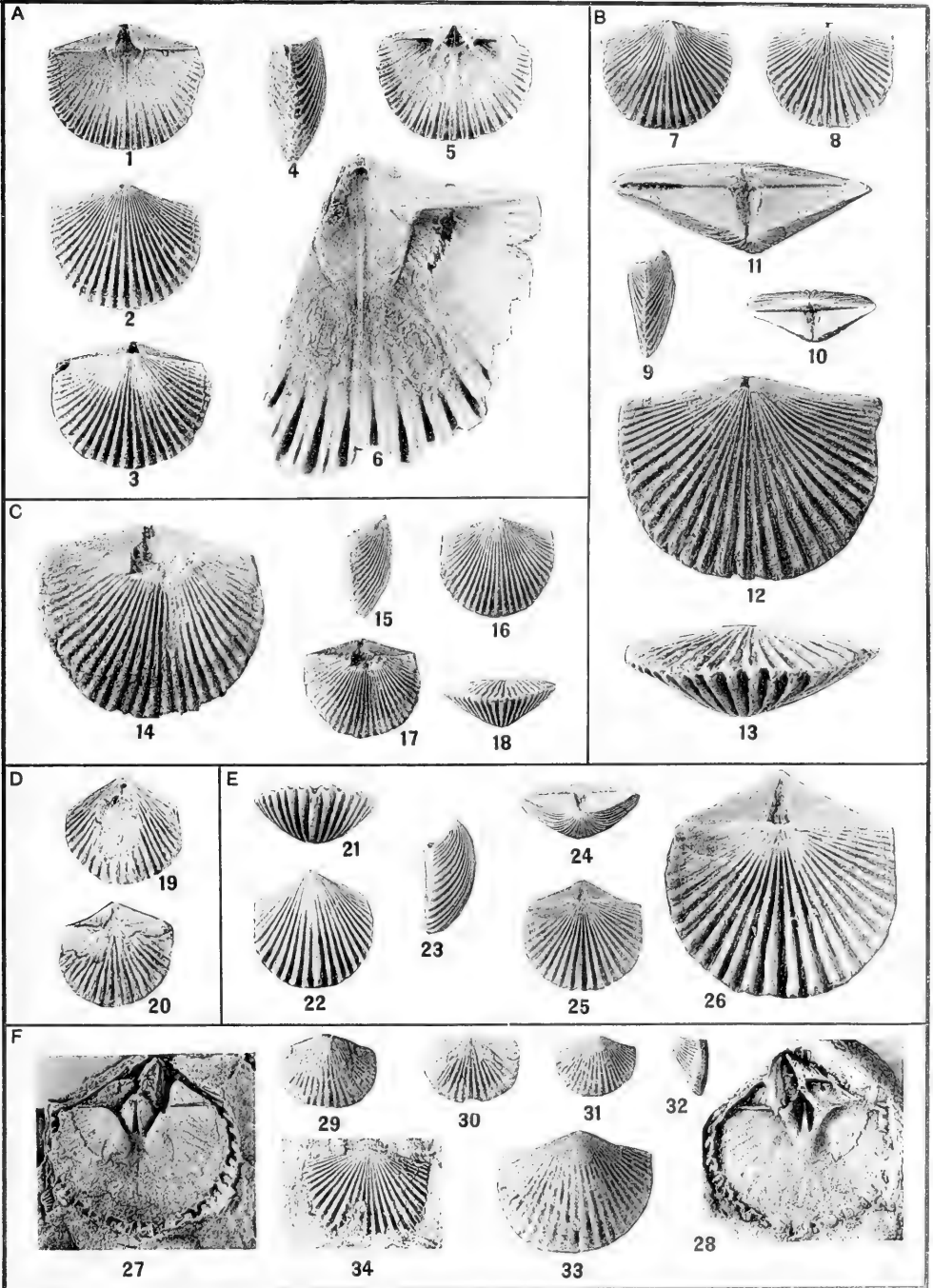
GLYPTORTHIS, HESPERORTHIS, ORTHAMBONITES, PRODUCTORTHIS,  
PTYCHOPLEURELLA, TAPHORTHIS

(SEE EXPLANATION OF PLATES.)



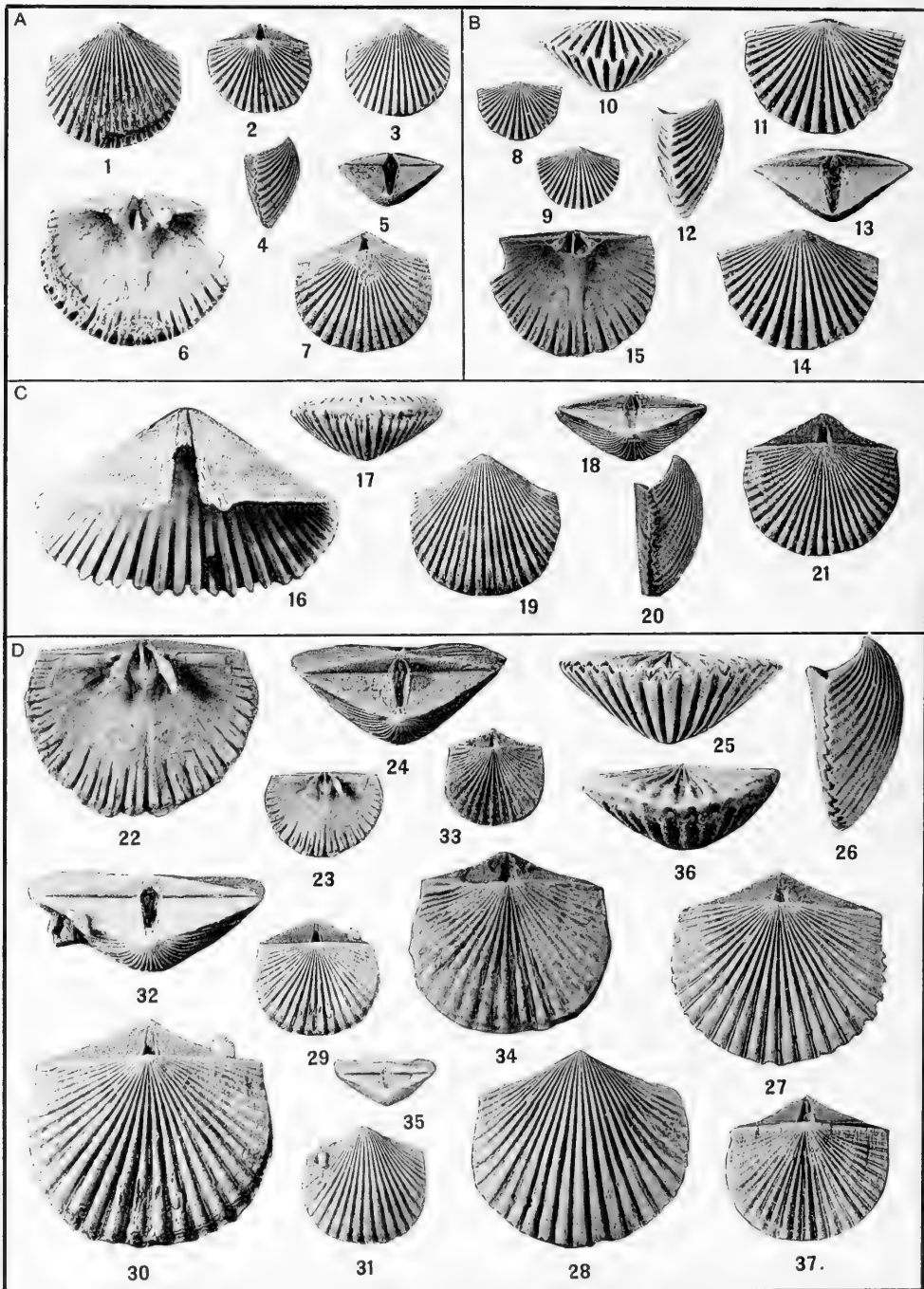
ATELELASMA, CYRTONOTELLA, DESMORTHIS, EREMOTOECHIA, GLYPTORTHIS, HESPERORTHIS, PTYCHOPLEURELLA

(SEE EXPLANATION OF PLATES.)



HESPERORTHIS

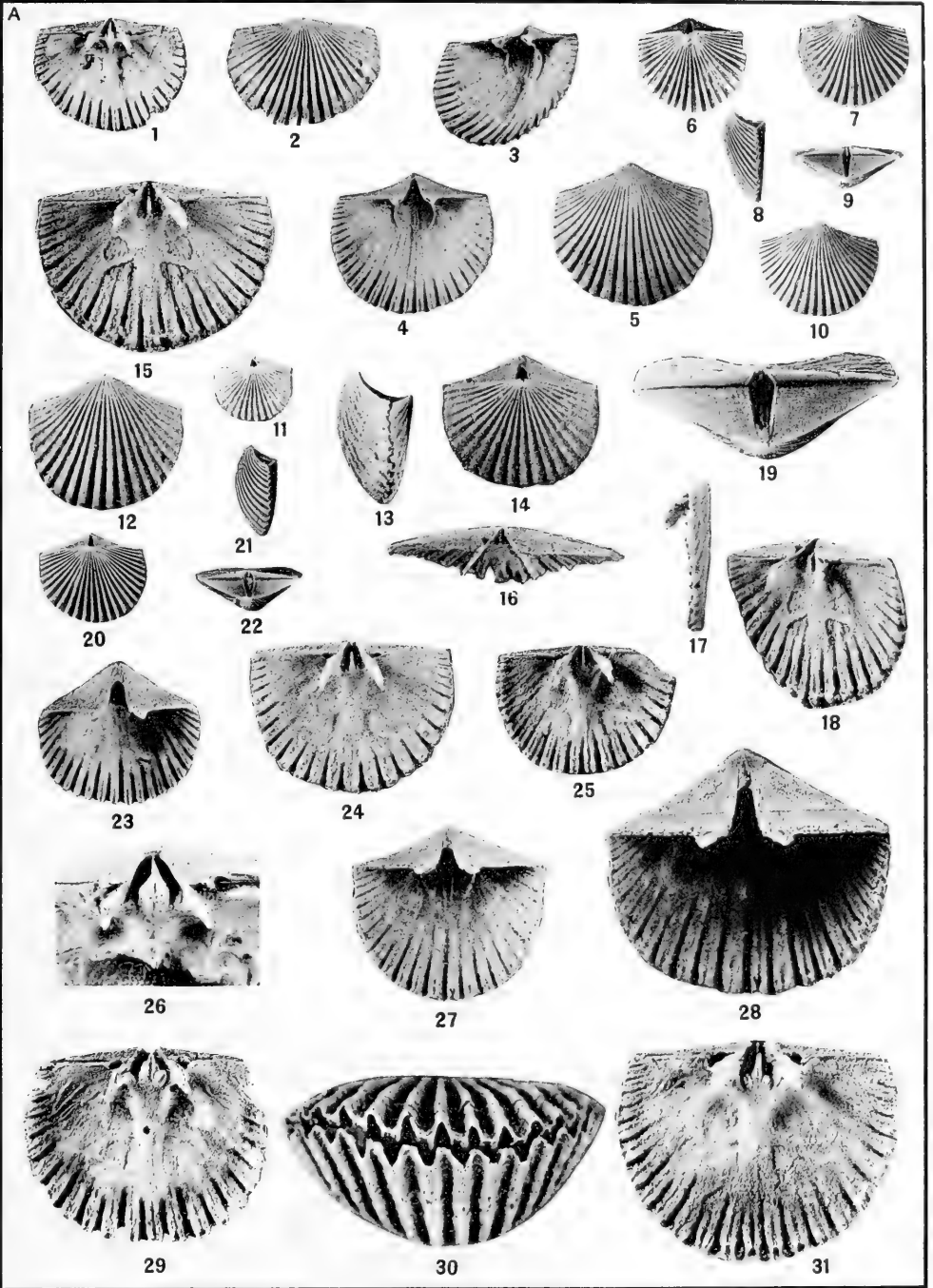
(SEE EXPLANATION OF PLATES.)



HESPERORTHIS

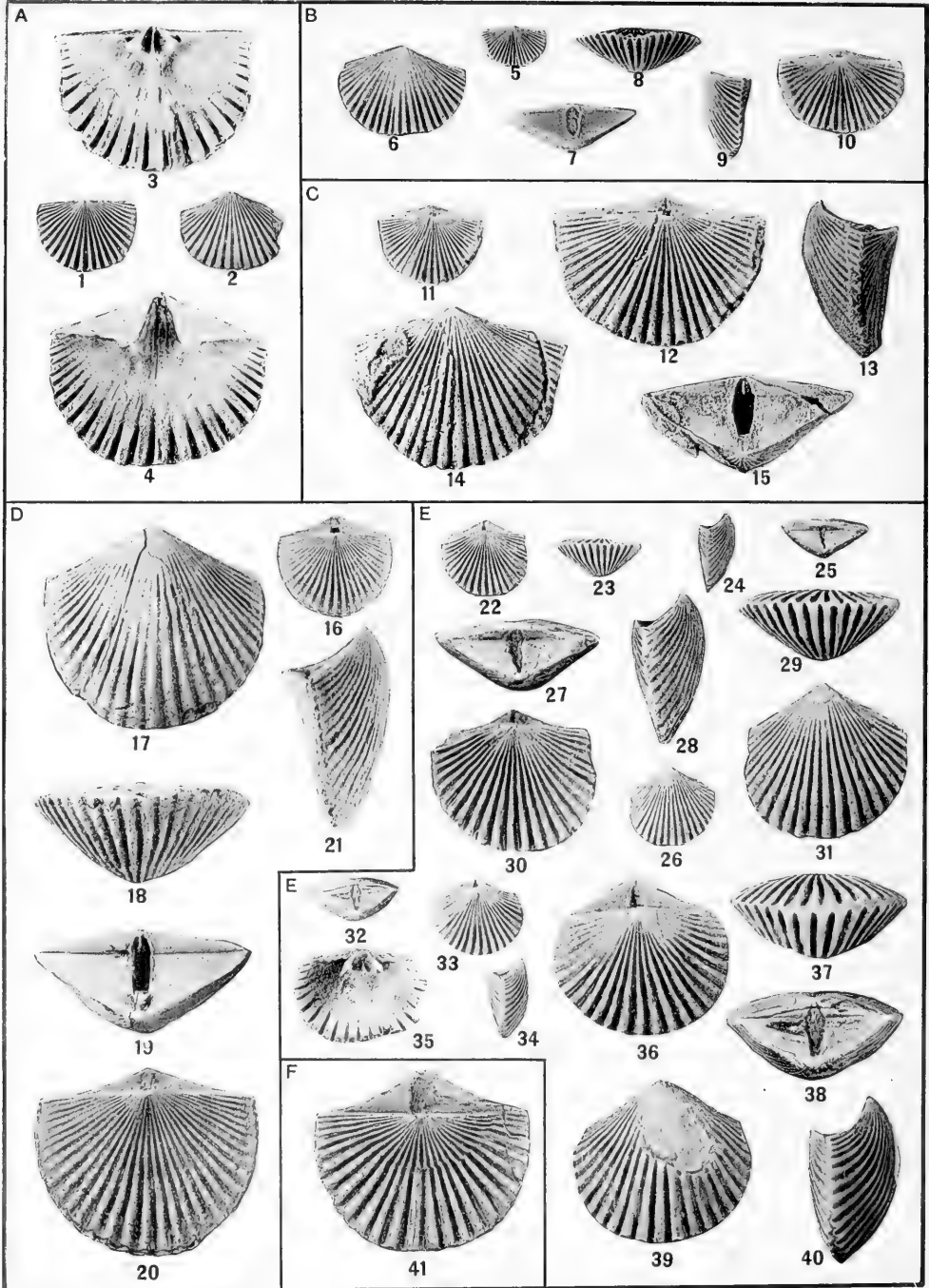
(SEE EXPLANATION OF PLATES.)





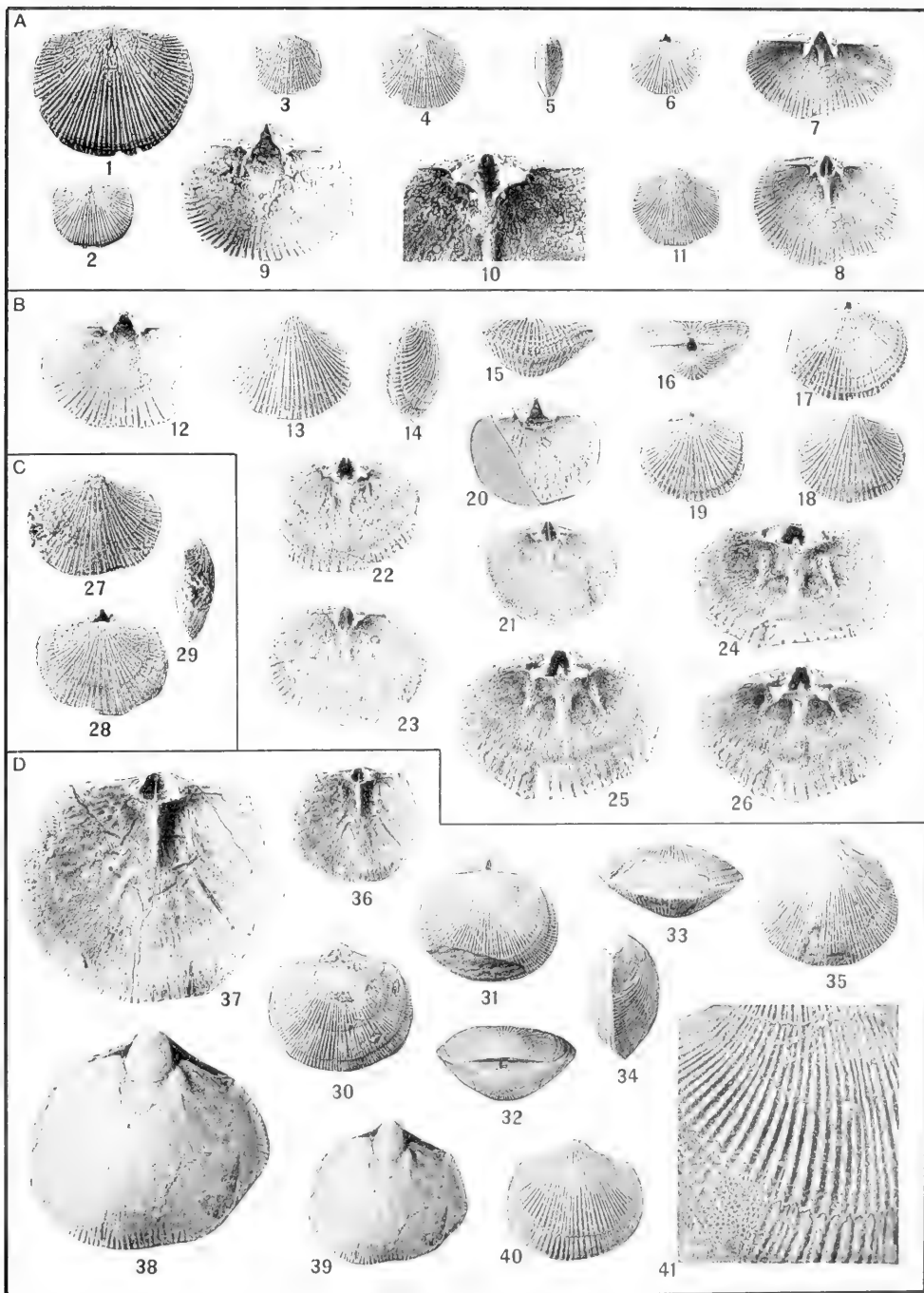
HESPERORTHIS

(SEE EXPLANATION OF PLATES.)



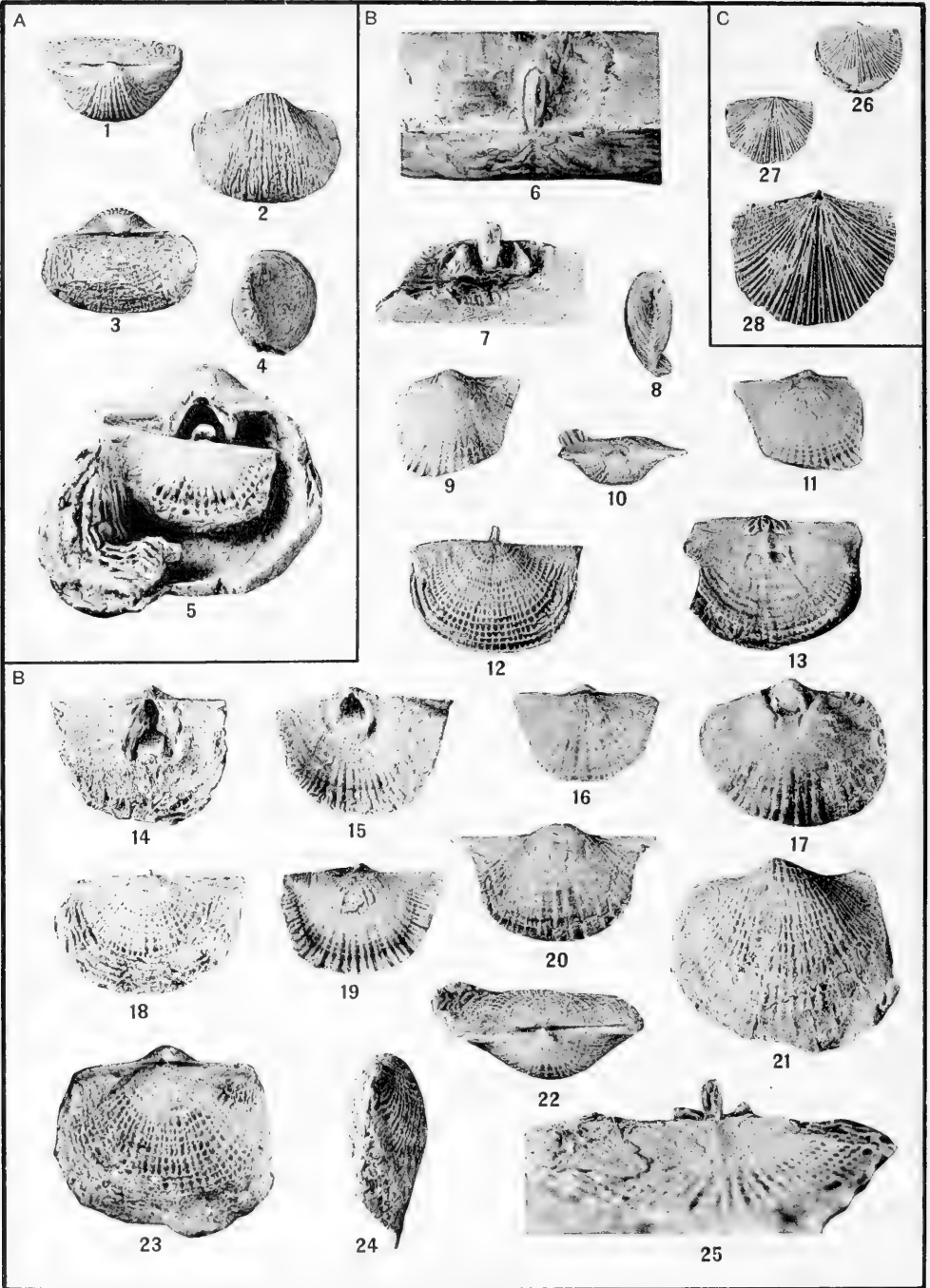
HESPERORTHIS

(SEE EXPLANATION OF PLATES.)



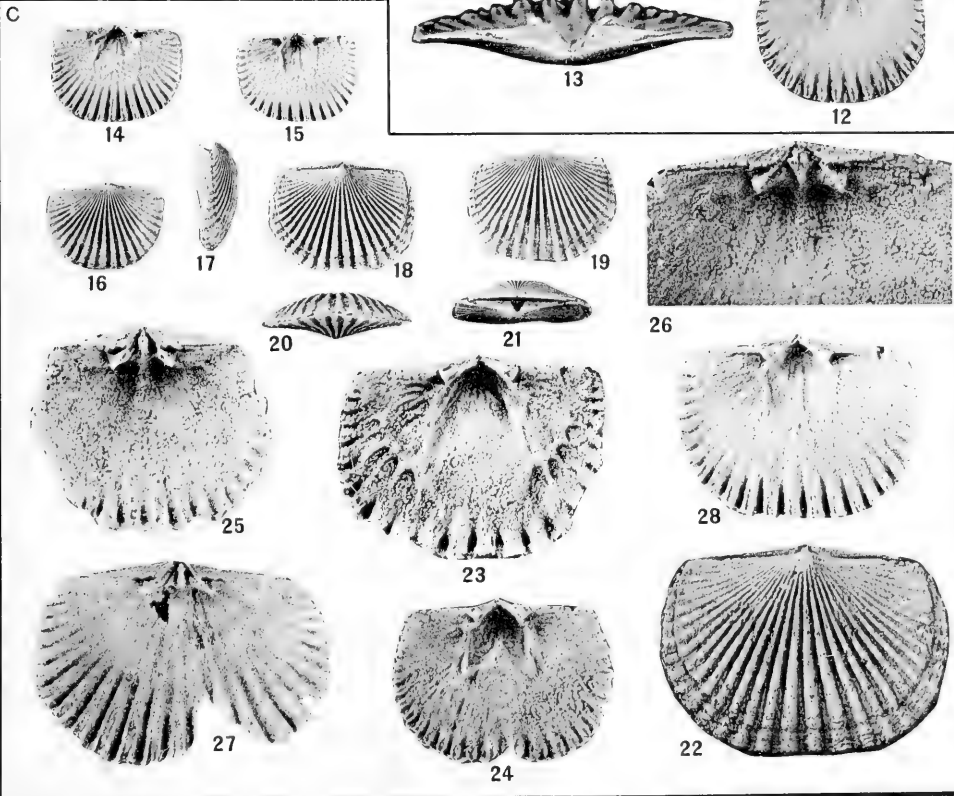
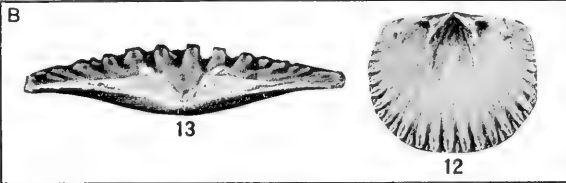
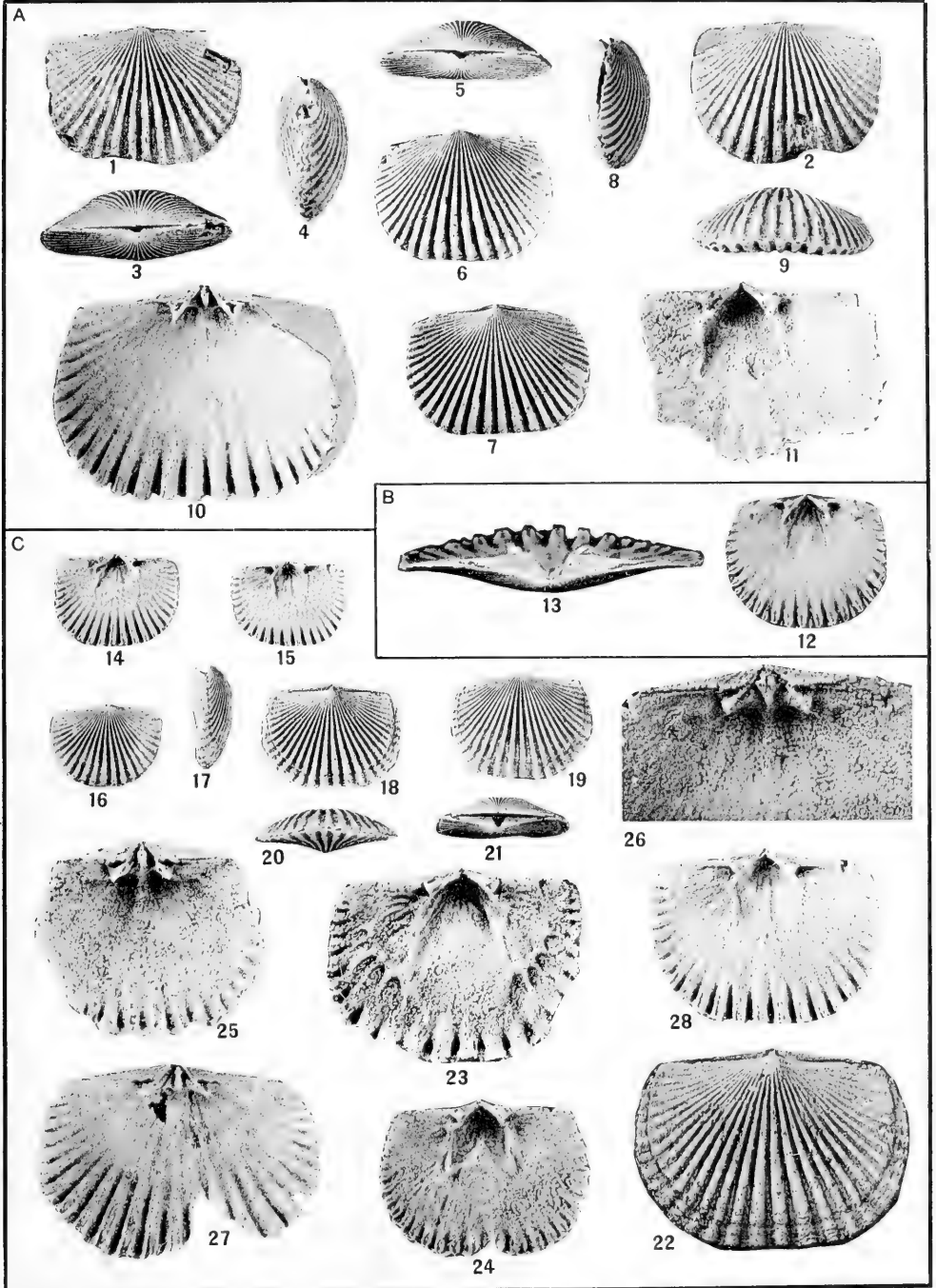
SCAPHORTHIS

(SEE EXPLANATION OF PLATES.)



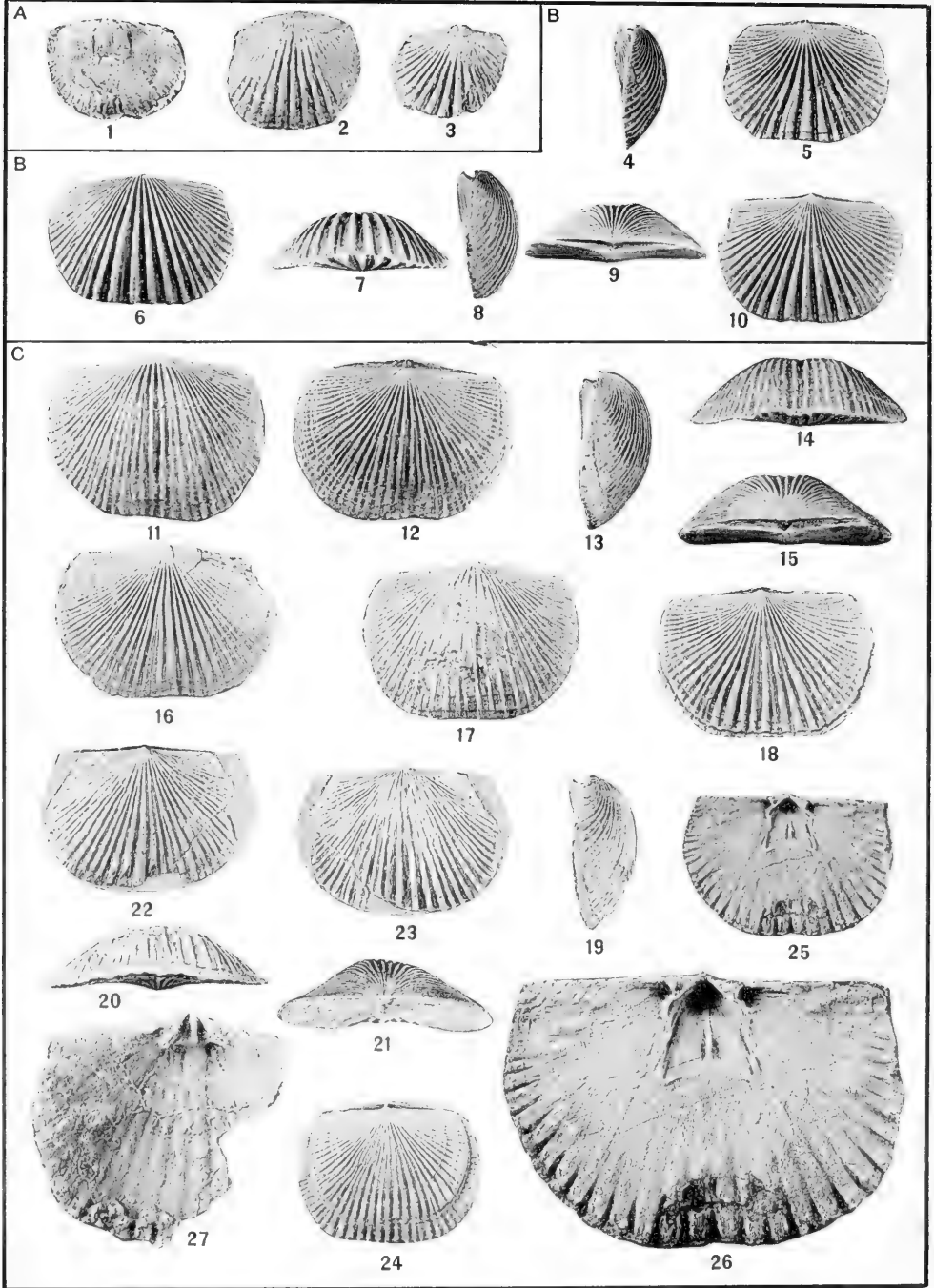
MULTICOSTELLA, PRODUCTORTHIS

(SEE EXPLANATION OF PLATES.)



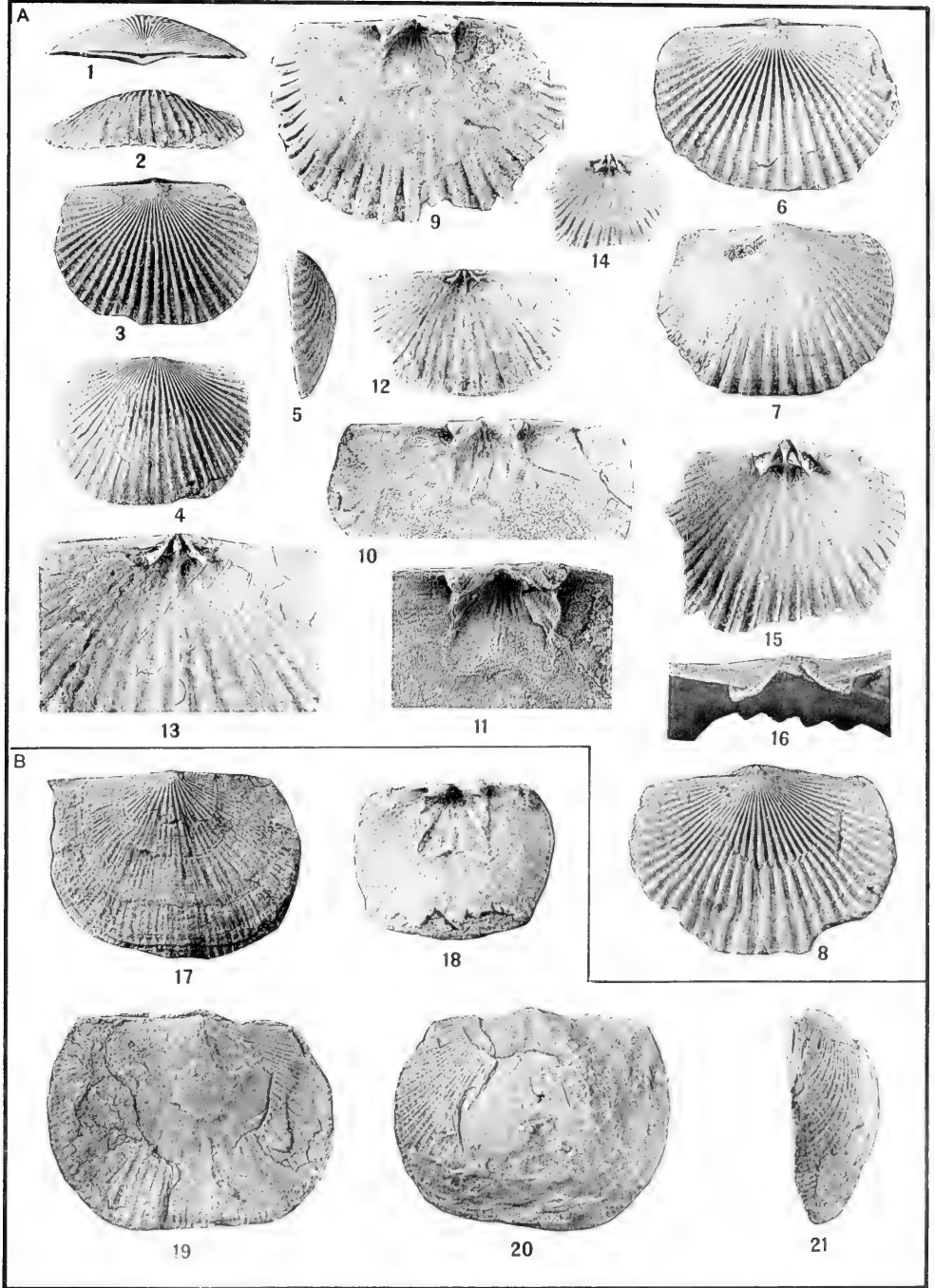
DINORTHIS

(SEE EXPLANATION OF PLATES.)



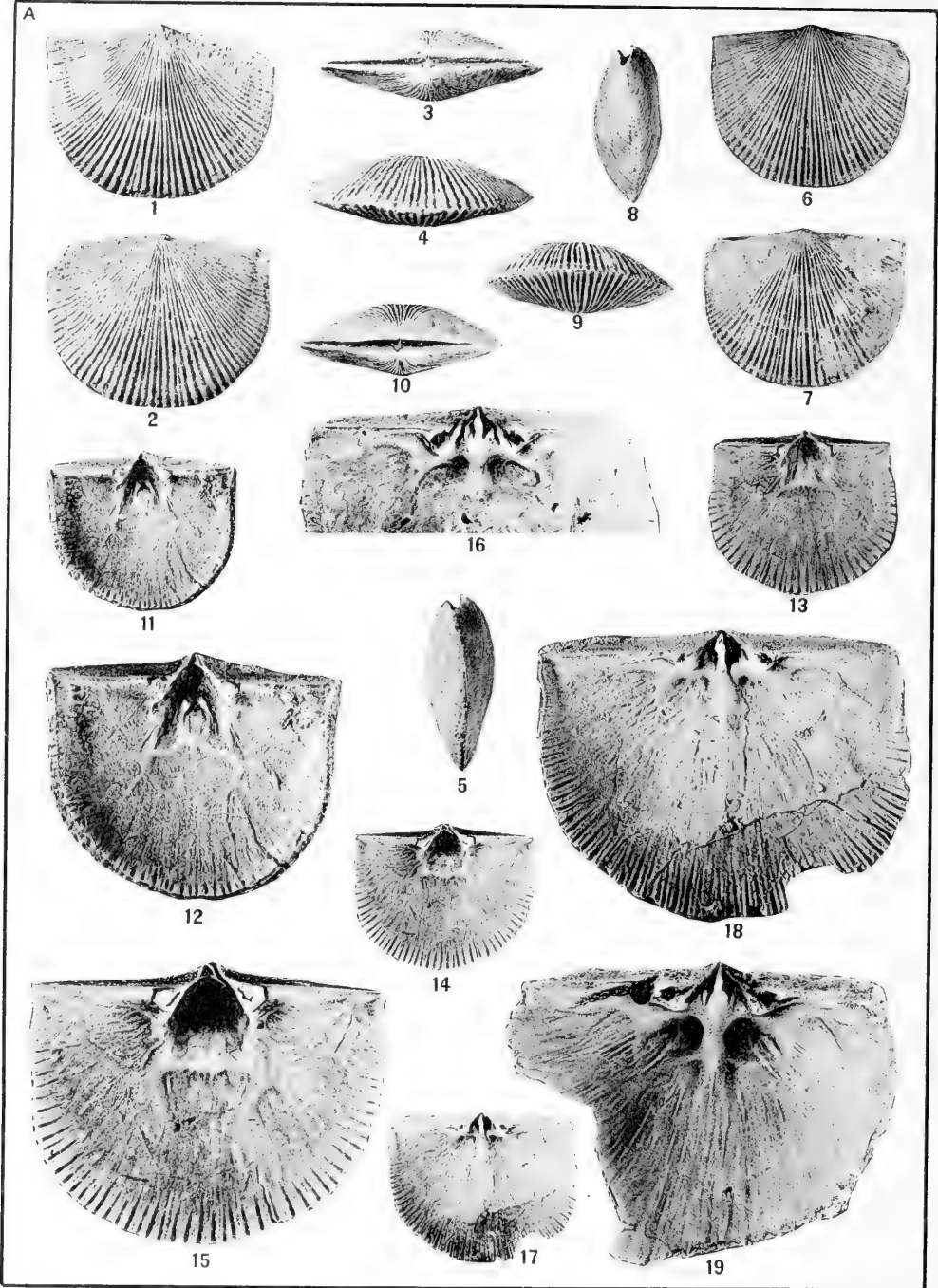
DINORTHIS

(SEE EXPLANATION OF PLATES.)



DINORTHIS

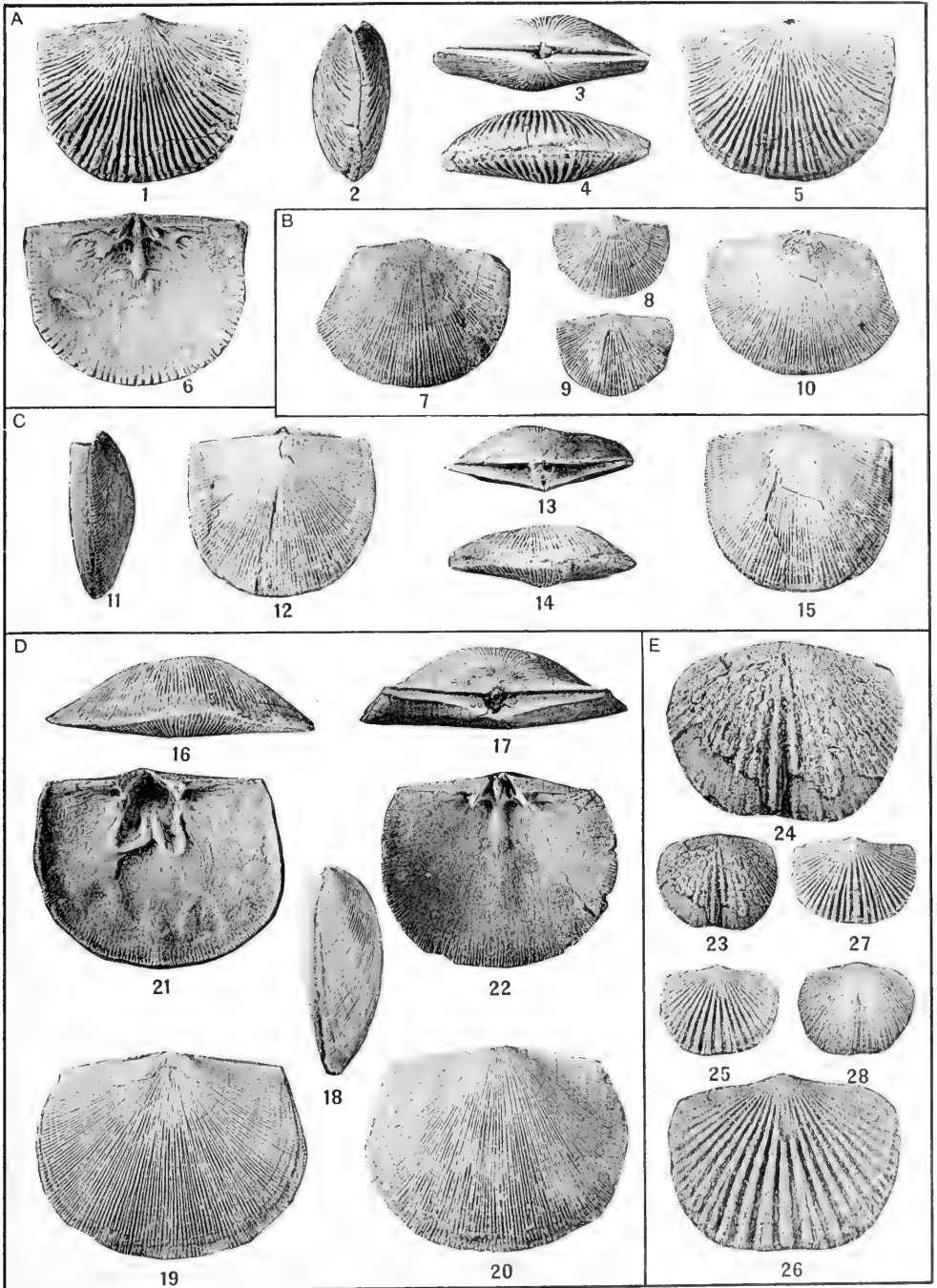
(SEE EXPLANATION OF PLATES.)



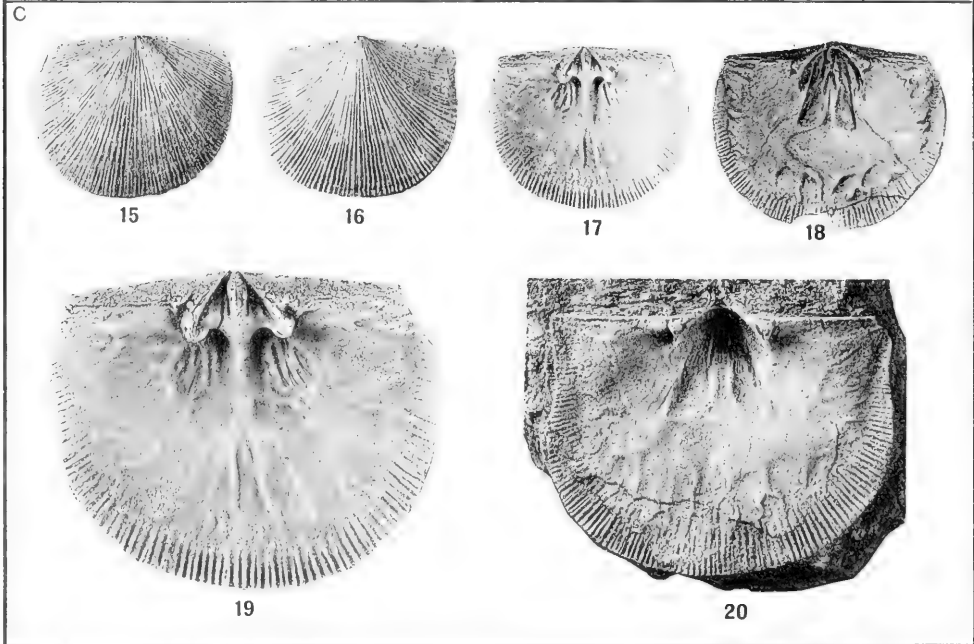
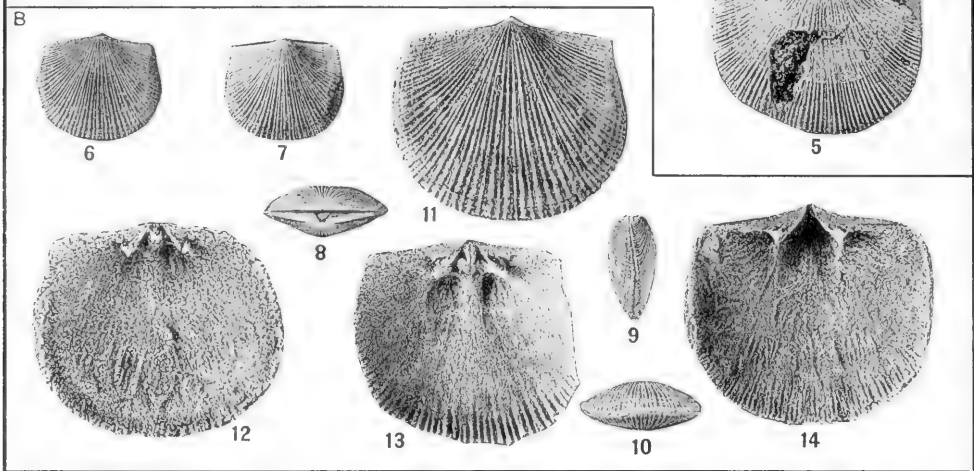
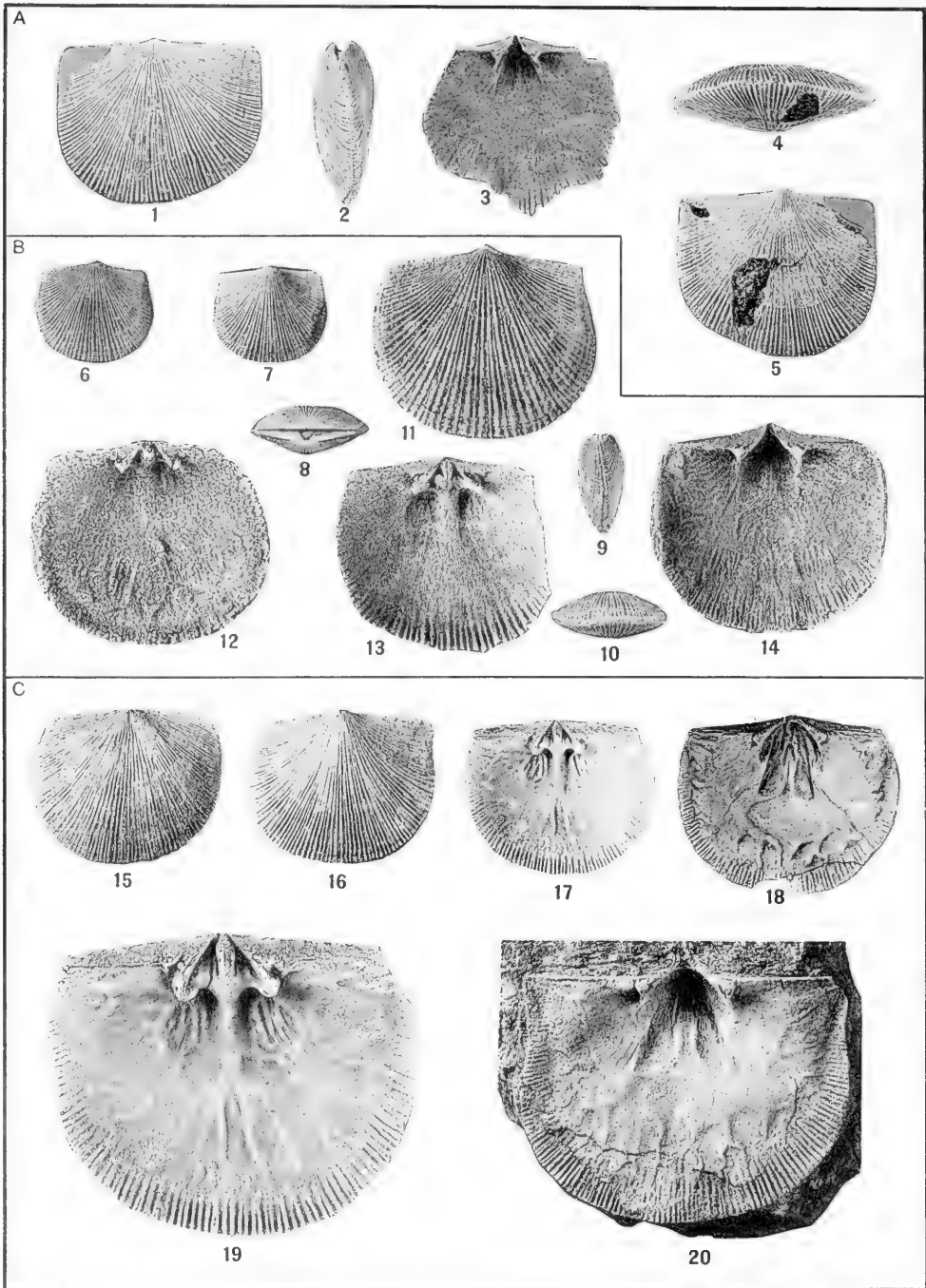
MULTICOSTELLA

(SEE EXPLANATION OF PLATES.)

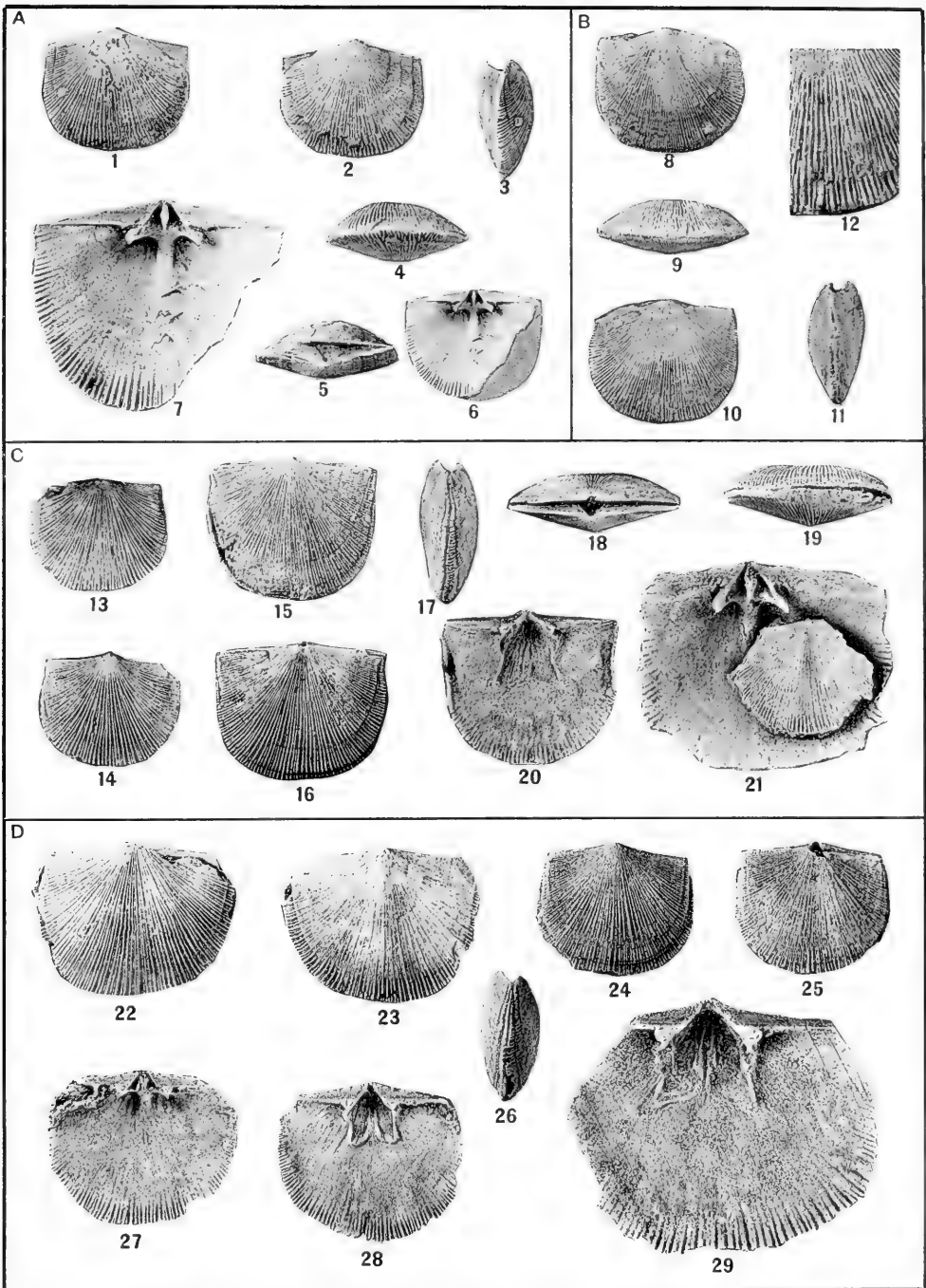




CHAULISTOMELLA, DINORTHIS, MULTICOSTELLA  
(SEE EXPLANATION OF PLATES.)

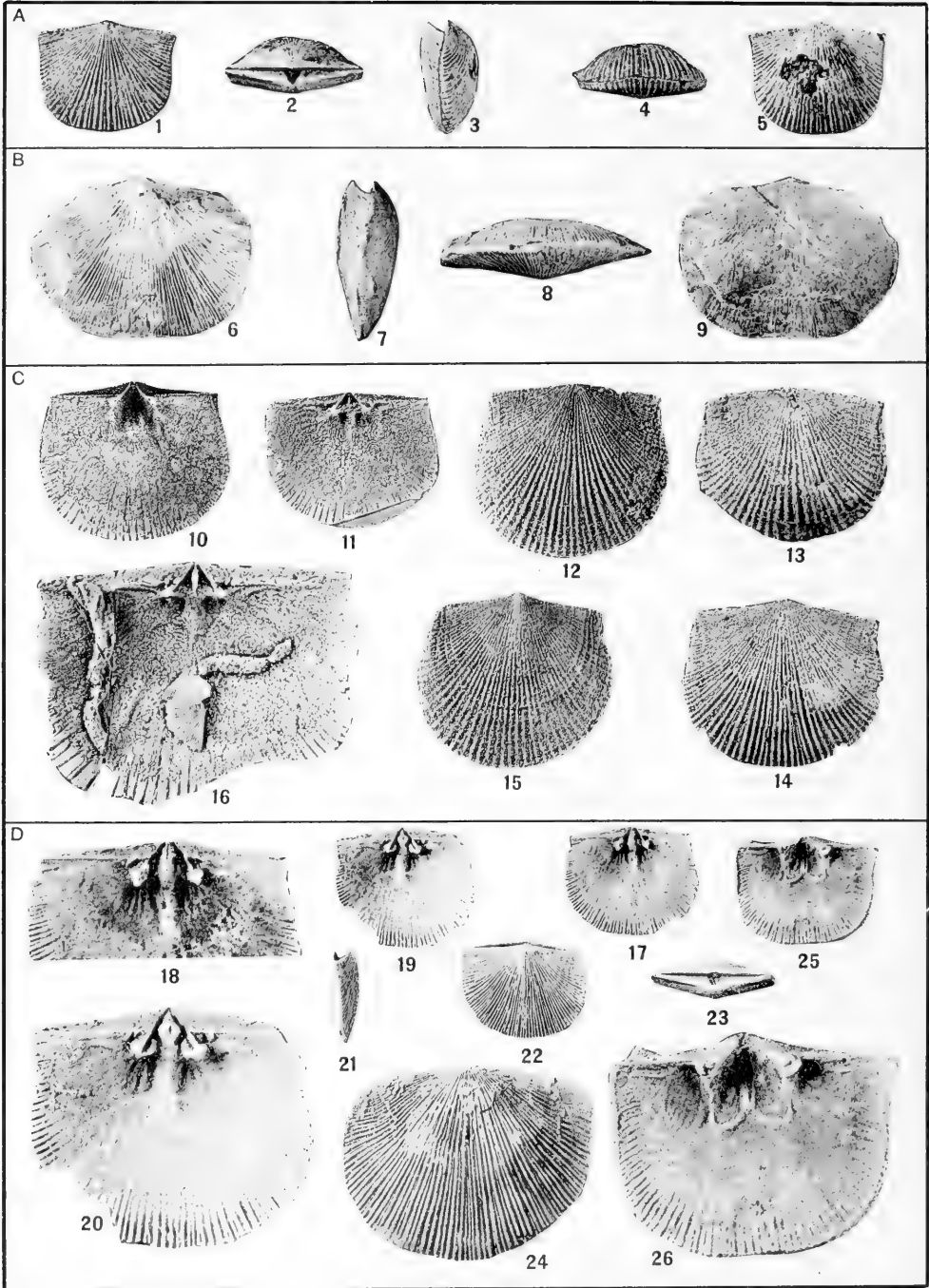


MULTICOSTELLA  
(SEE EXPLANATION OF PLATES.)



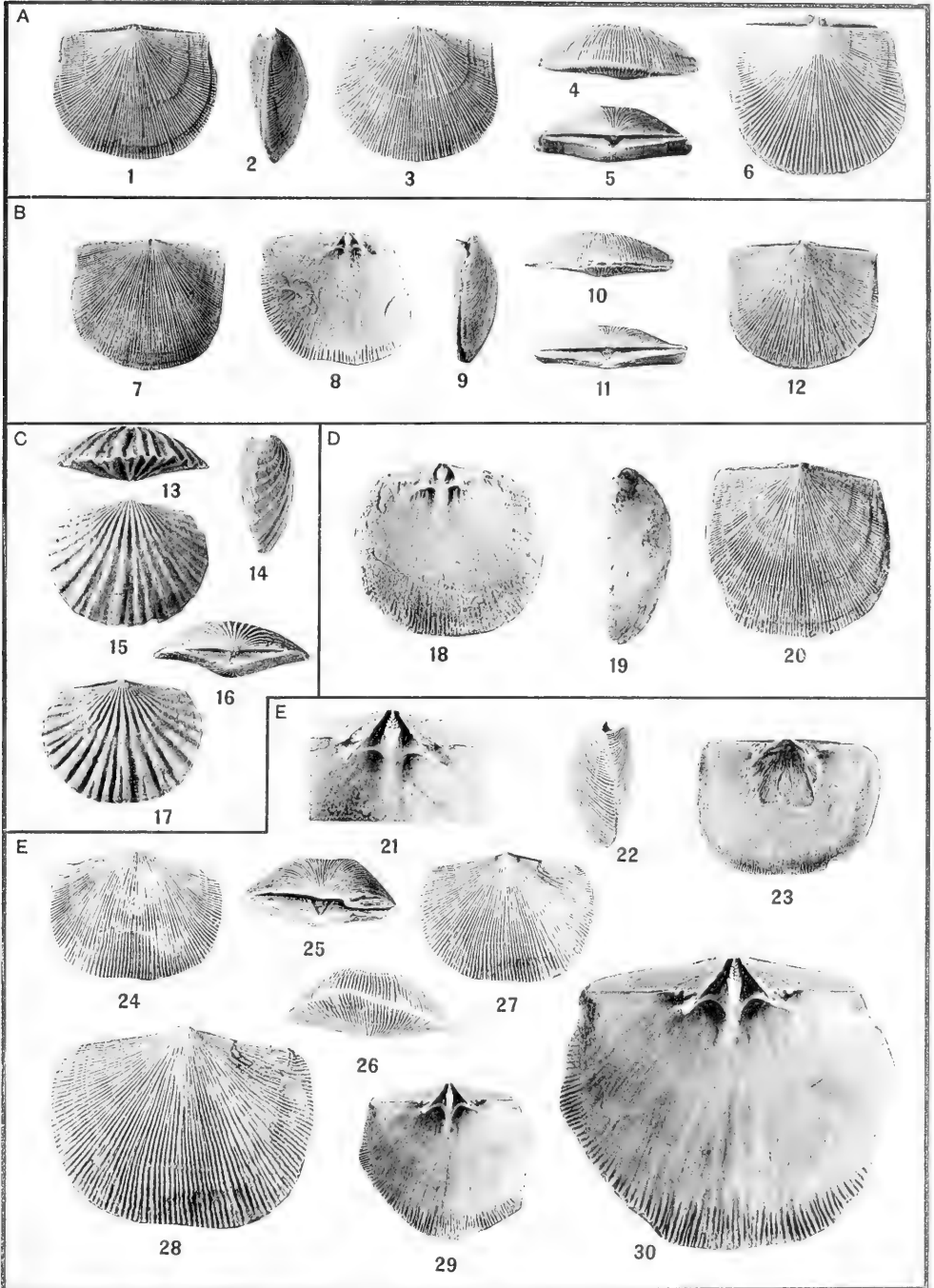
CHAULISTOMELLA, MULTICOSTELLA

(SEE EXPLANATION OF PLATES.)

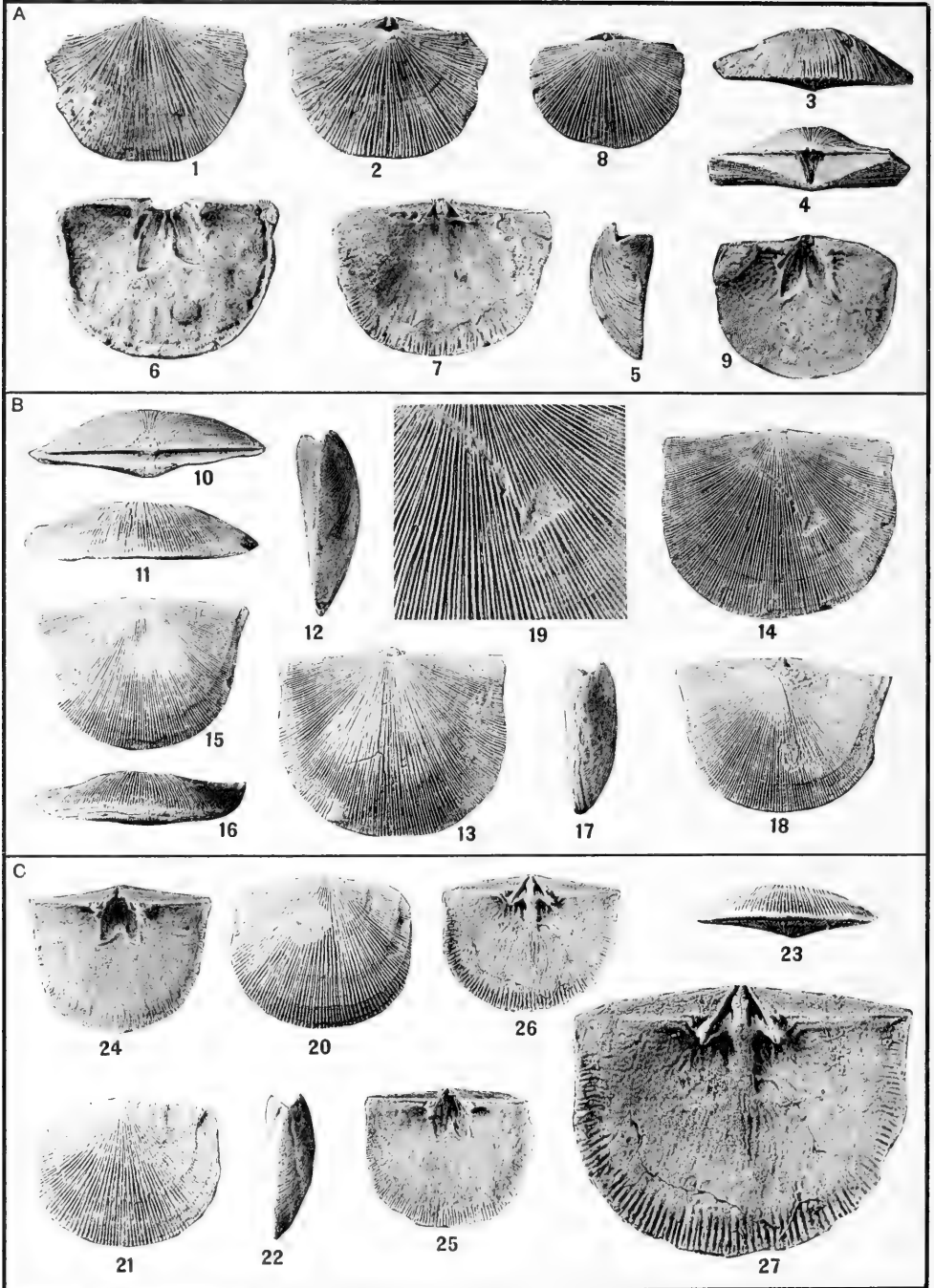


CHAULISTOMELLA, MULTICOSTELLA

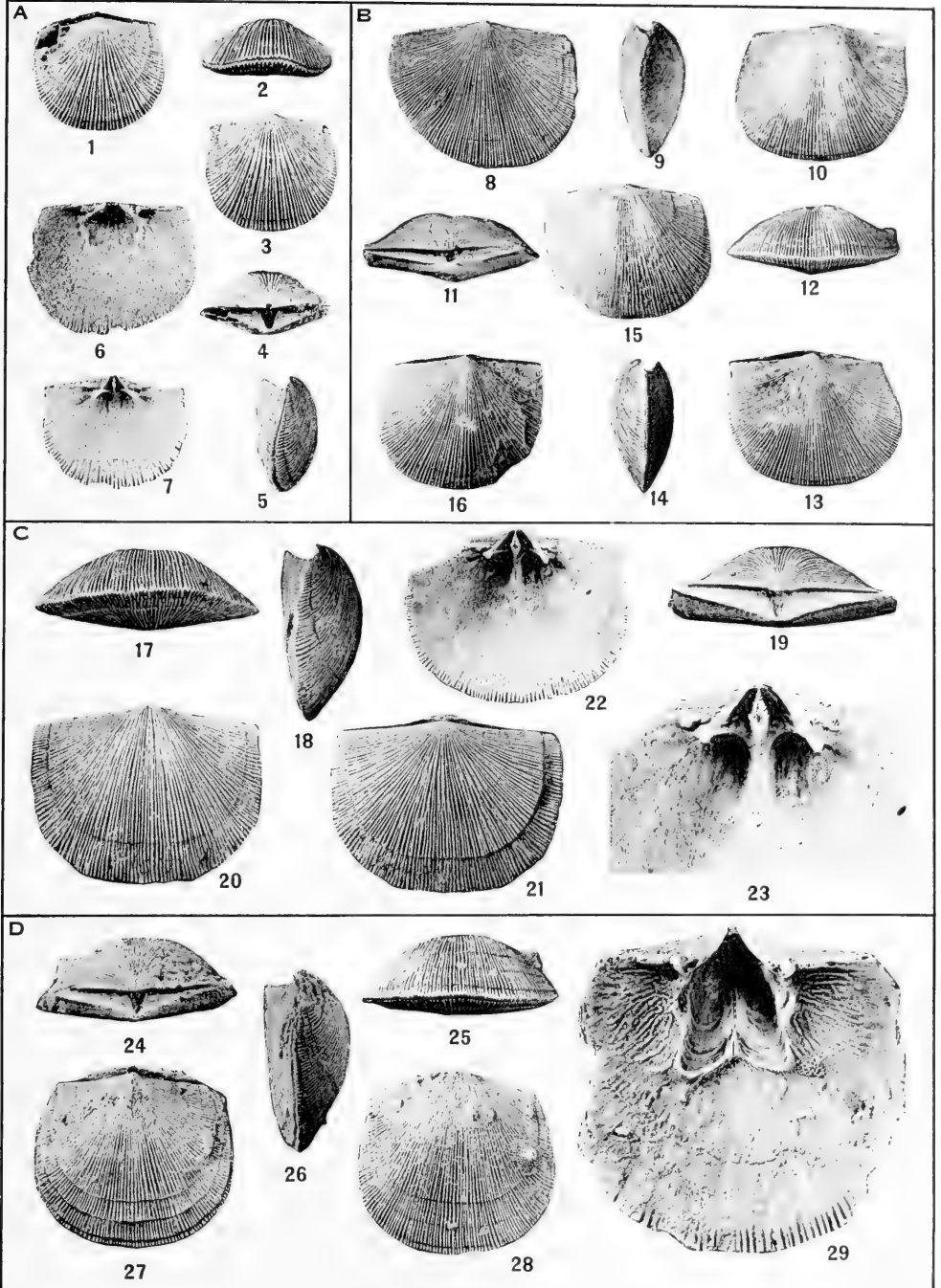
(SEE EXPLANATION OF PLATES.)



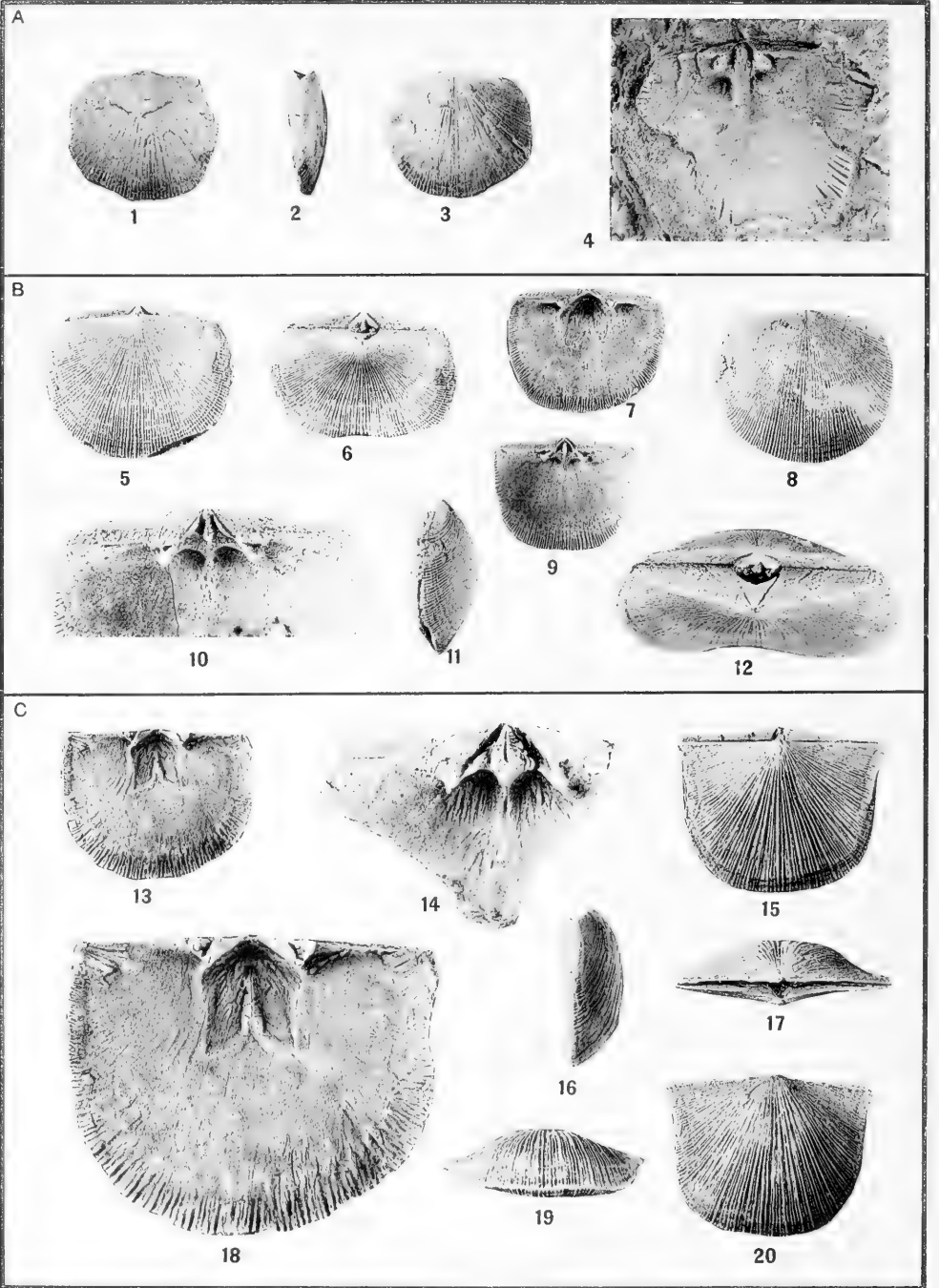
CHAULISTOMELLA, DINORTHIS  
(SEE EXPLANATION OF PLATES.)



CHAULISTOMELLA  
(SEE EXPLANATION OF PLATES.)



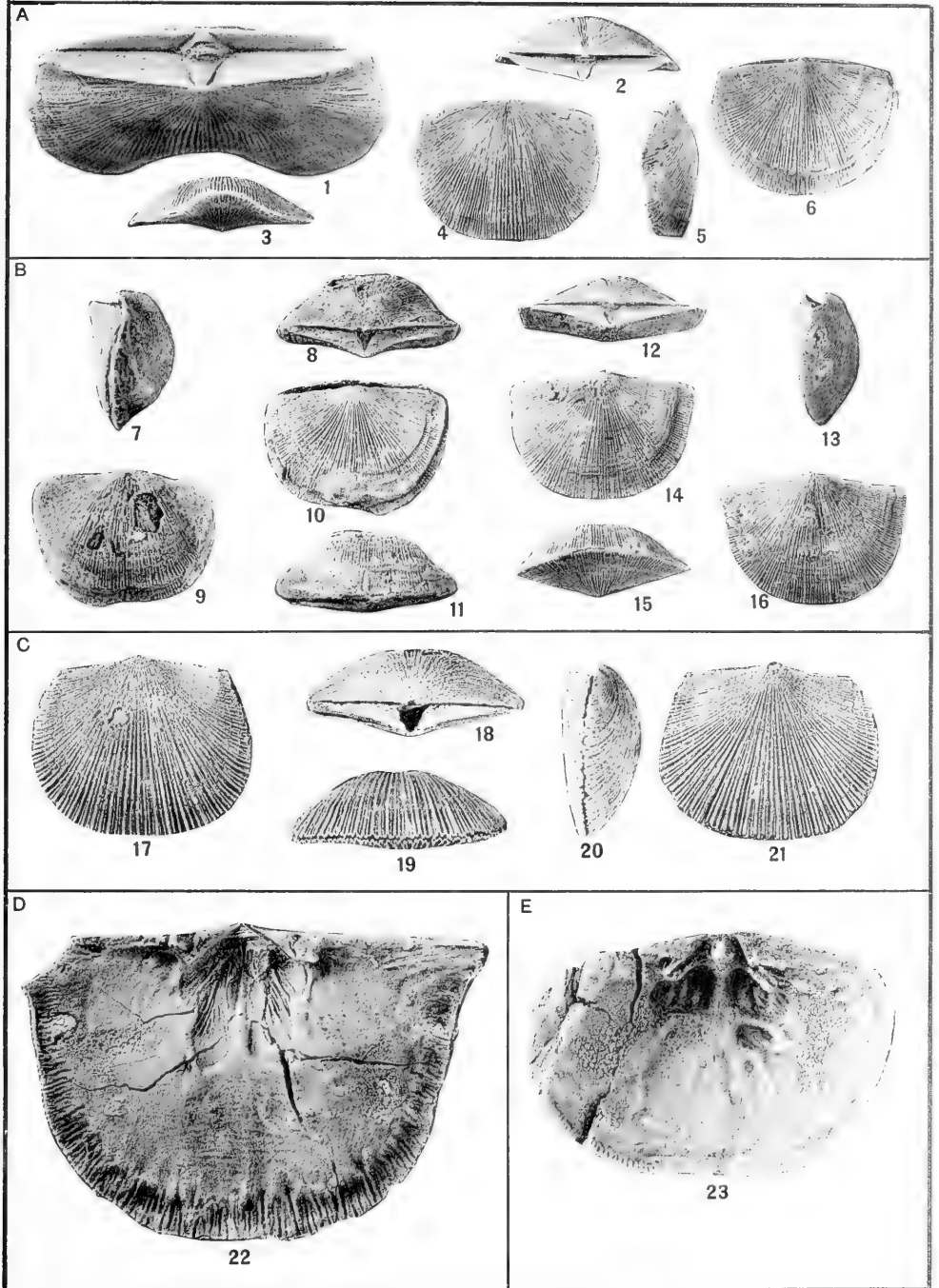
CHAULISTOMELLA  
(SEE EXPLANATION OF PLATES.)



CAMPYLORTHIS, CHAULISTOMELLA, MULTICOSTELLA

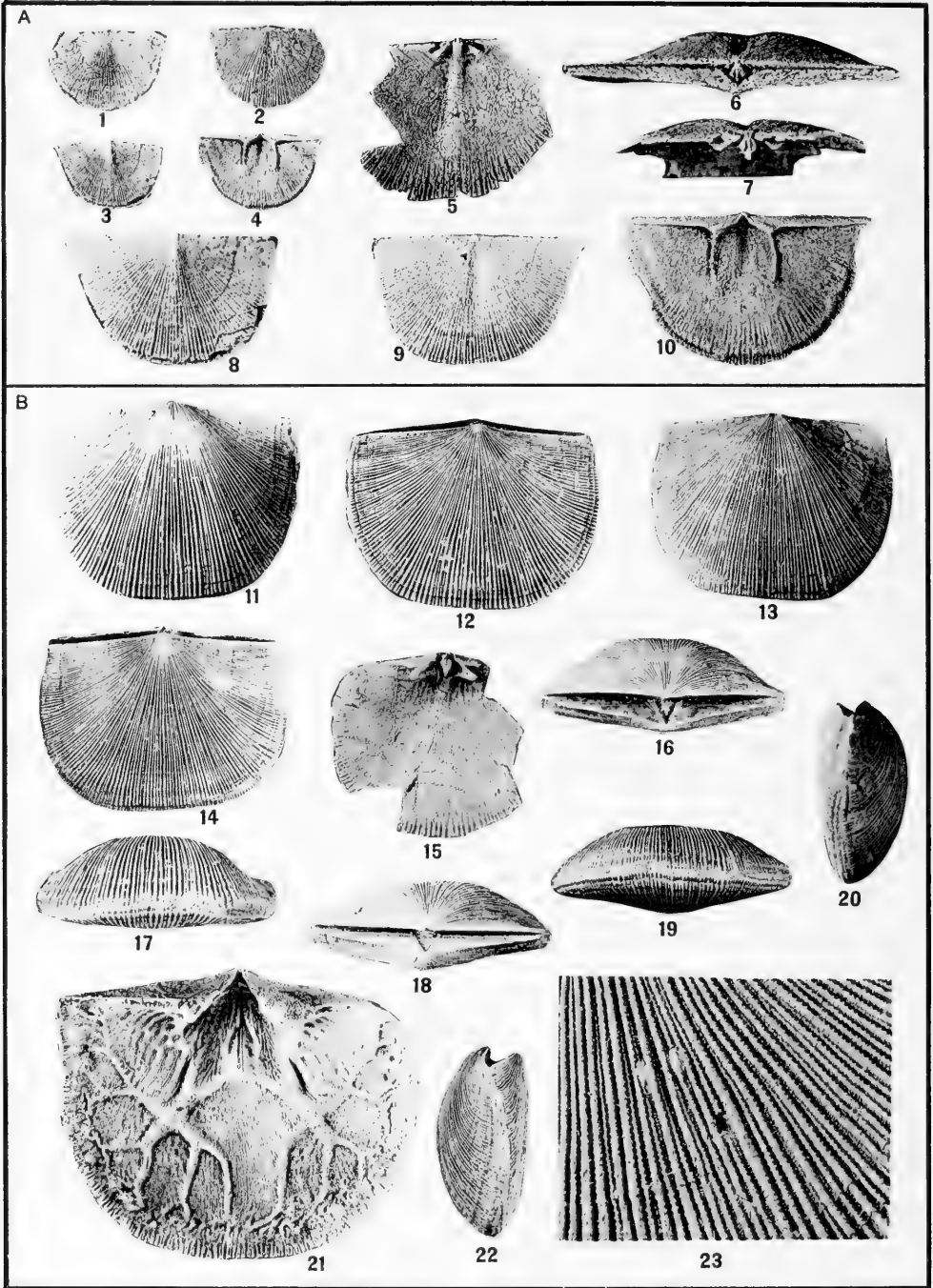
(SEE EXPLANATION OF PLATES.)



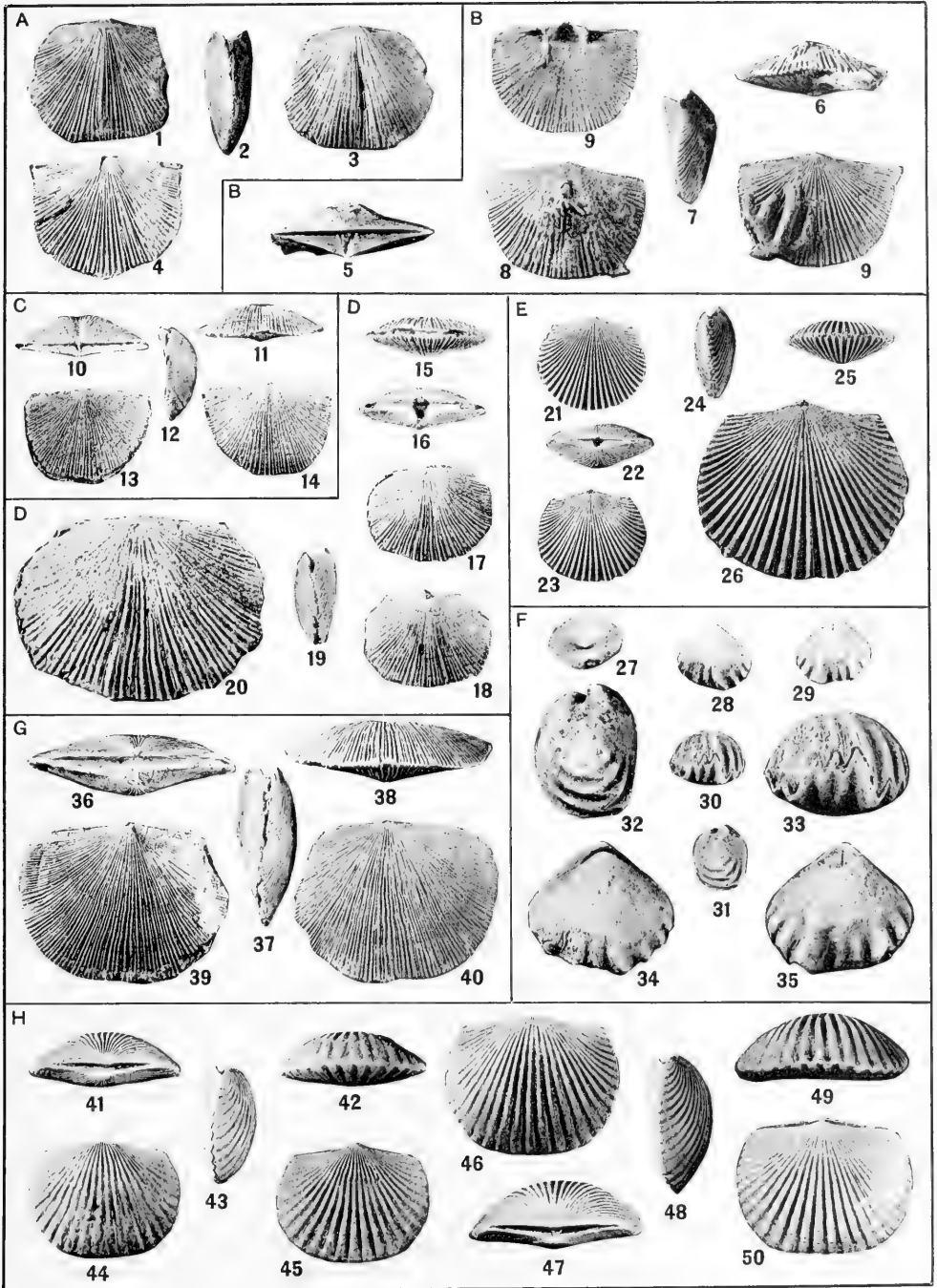


CAMPYLORTHIS, CHAULISTOMELLA

(SEE EXPLANATION OF PLATES.)

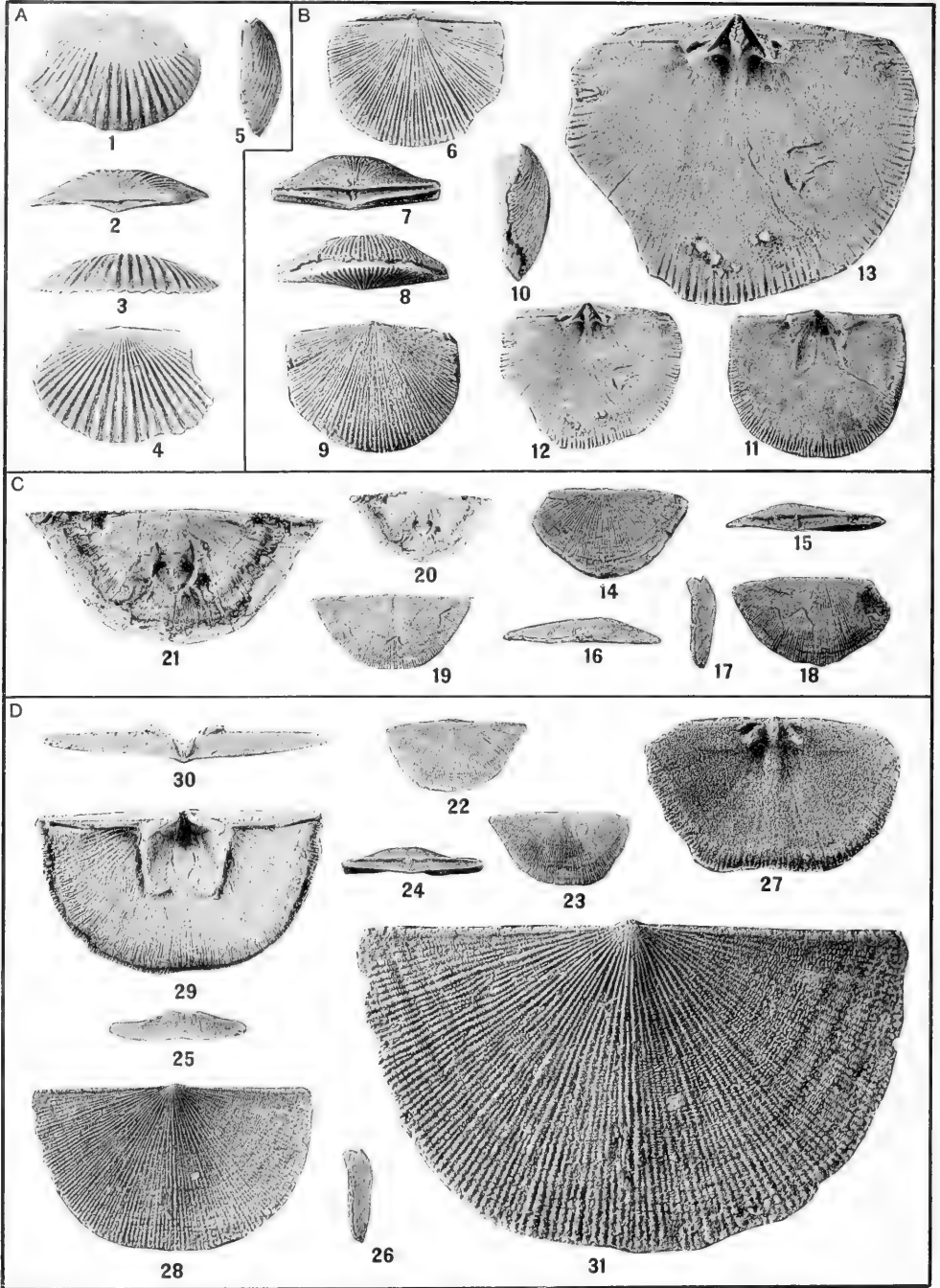


CHAULISTOMELLA, VALCOUREA  
(SEE EXPLANATION OF PLATES.)



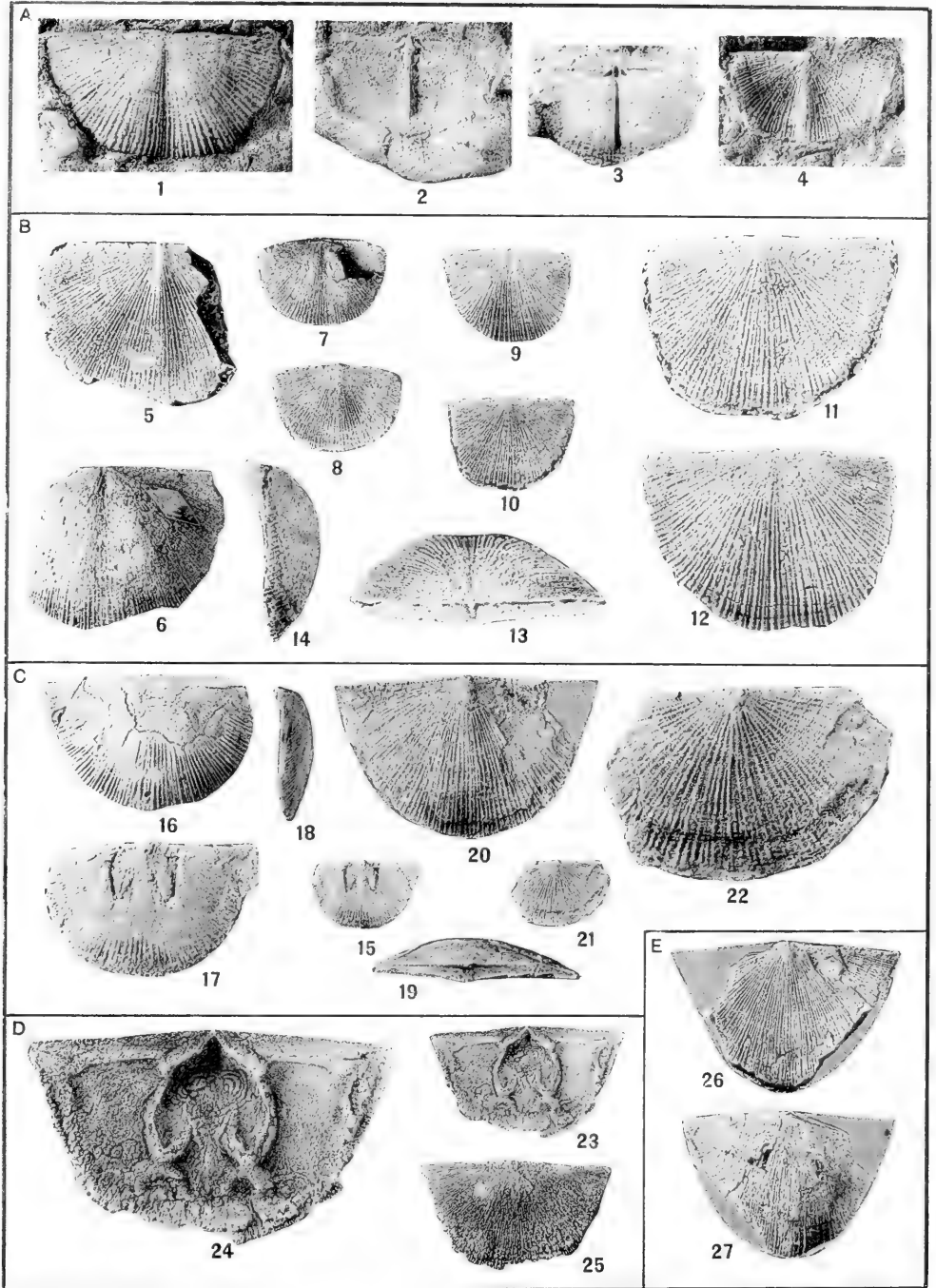
CAMERELLA, CHAULISTOMELLA, DINORTHIS, MULTICOSTELLA, PLECTORTHIS, VALCOUREA

(SEE EXPLANATION OF PLATES.)



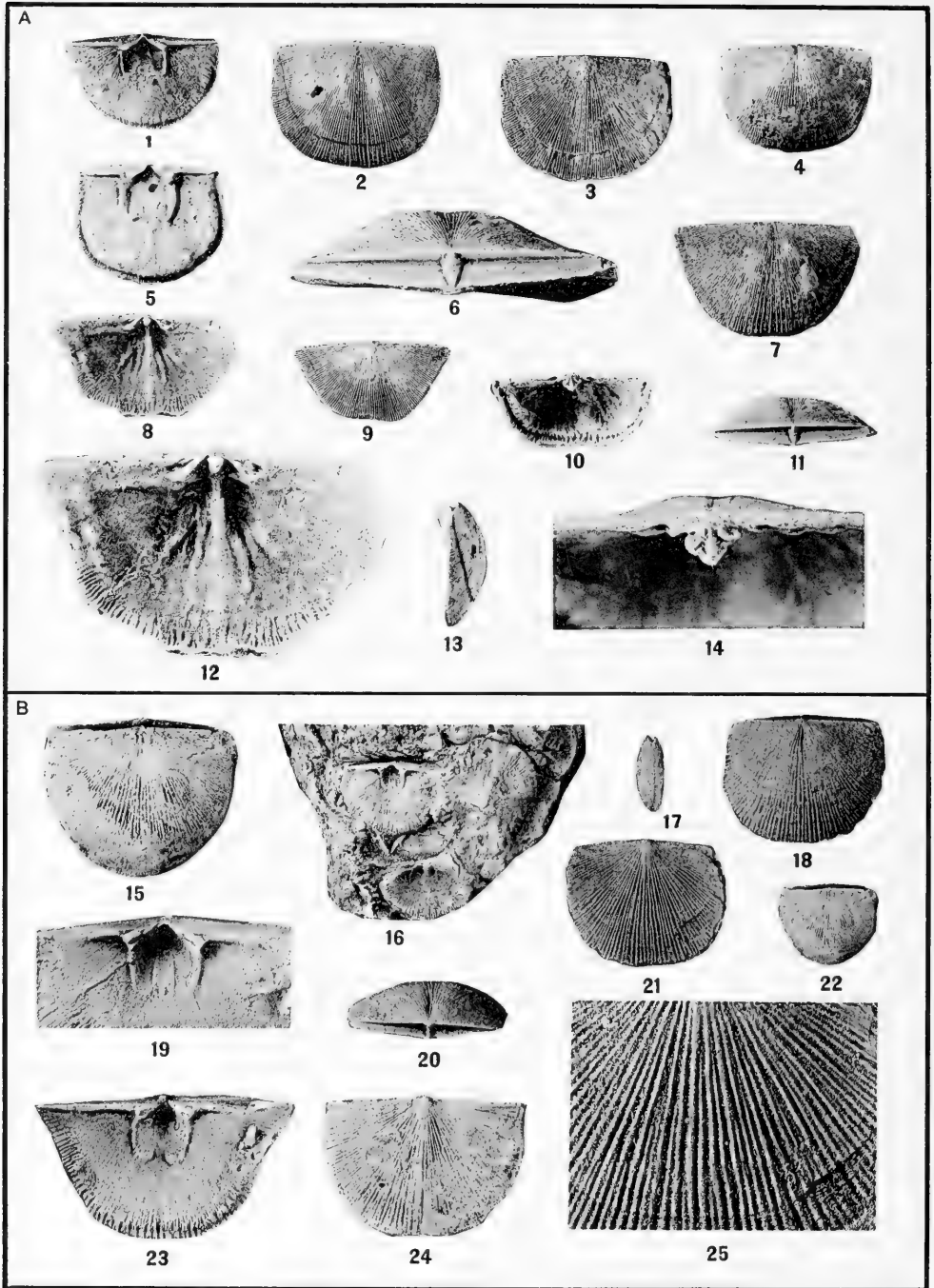
CHAULISTOMELLA, DINORTHIS, VALCOUREA

(SEE EXPLANATION OF PLATES.)



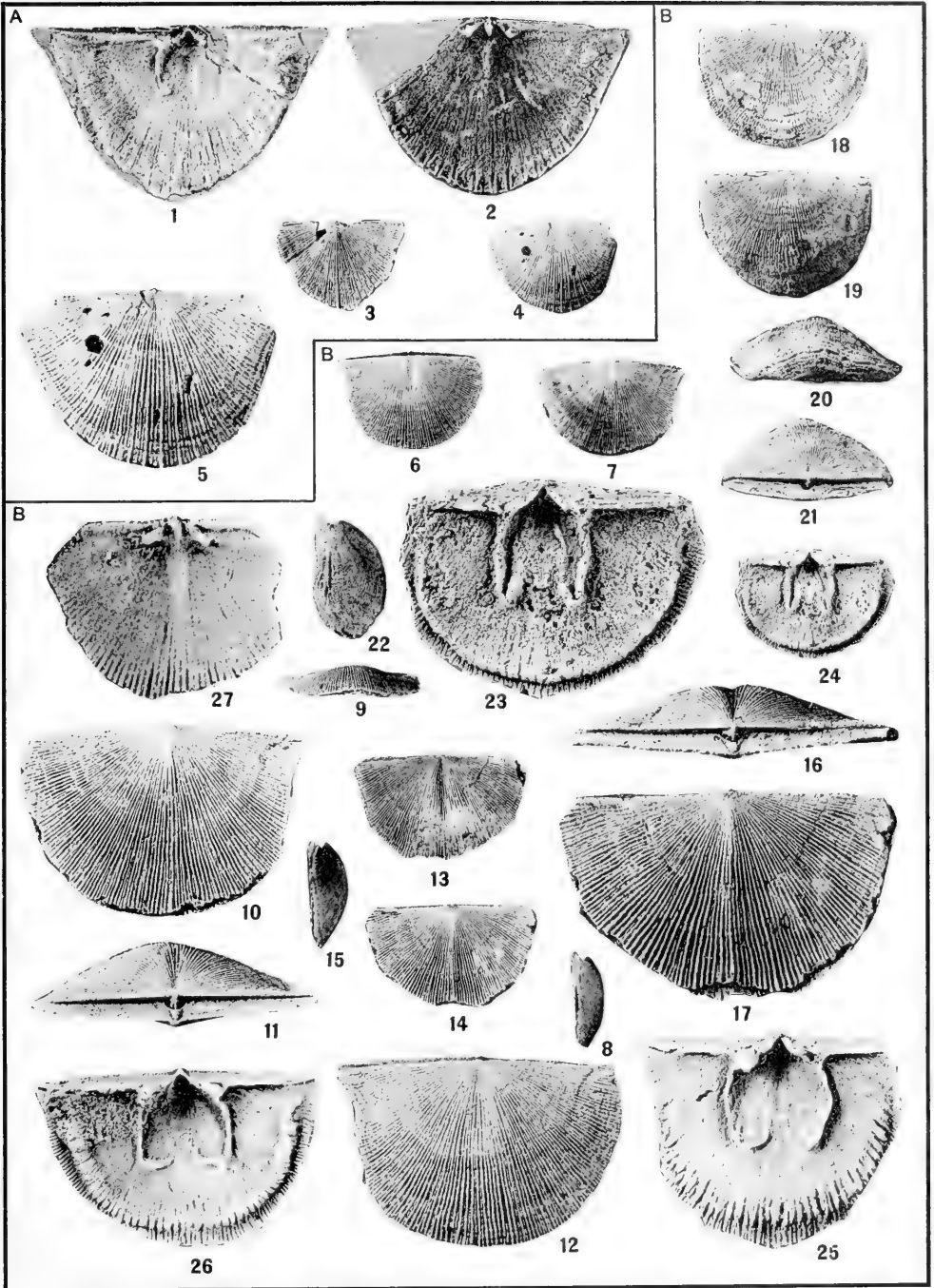
VALCOUREA

(SEE EXPLANATION OF PLATES )



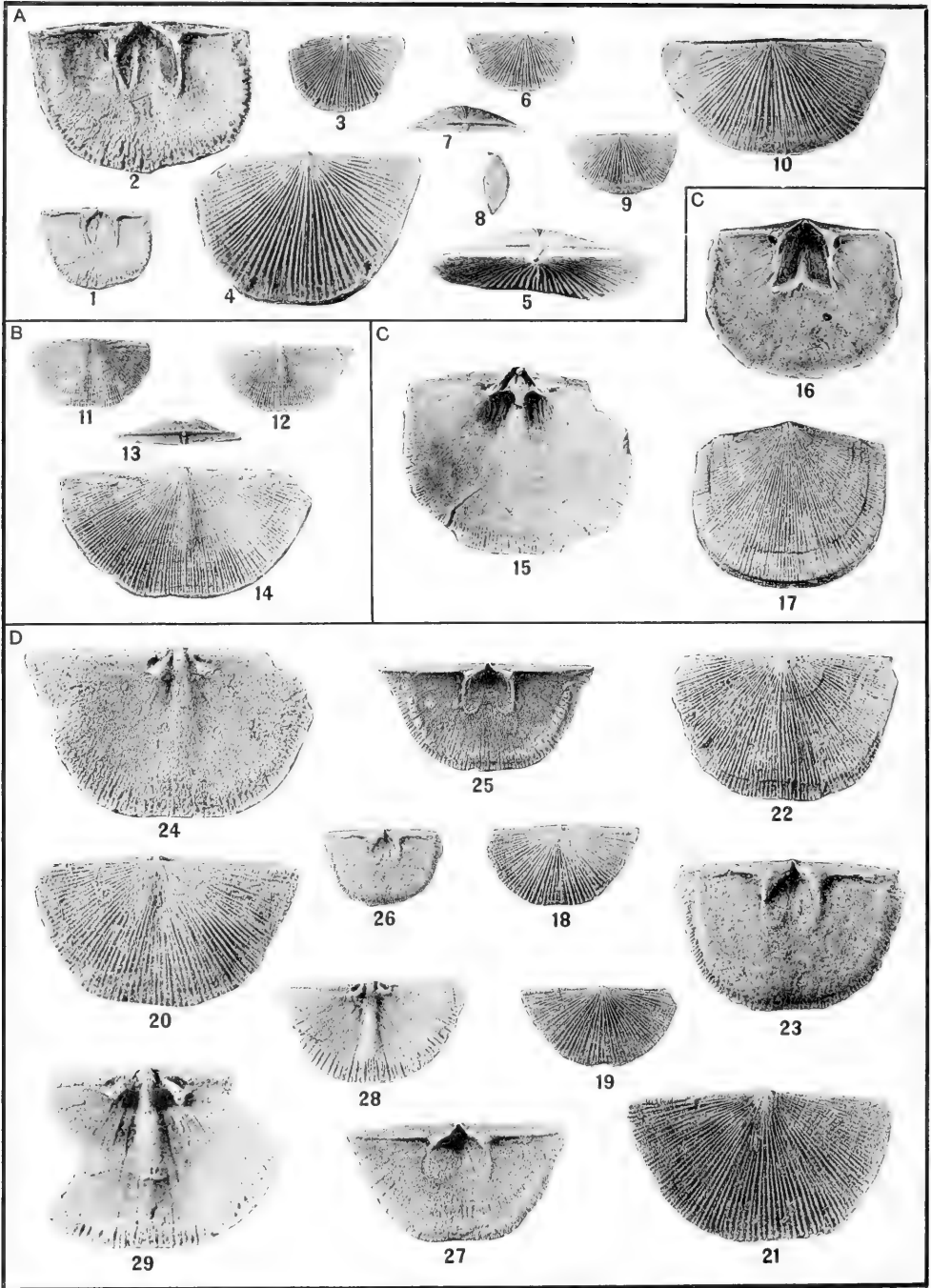
VALCOUREA

(SEE EXPLANATION OF PLATES.)



VALCOUREA

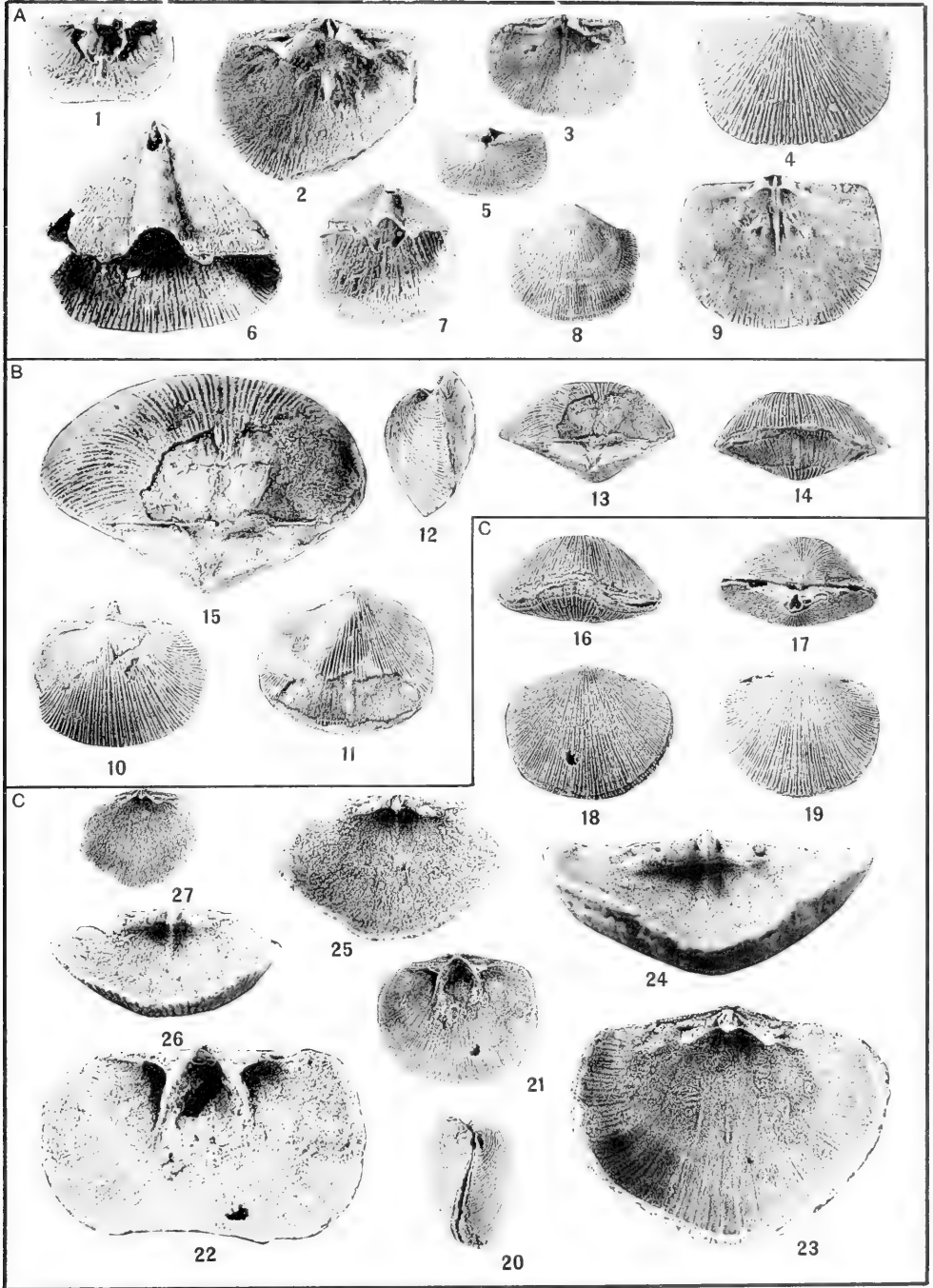
(SEE EXPLANATION OF PLATES.)



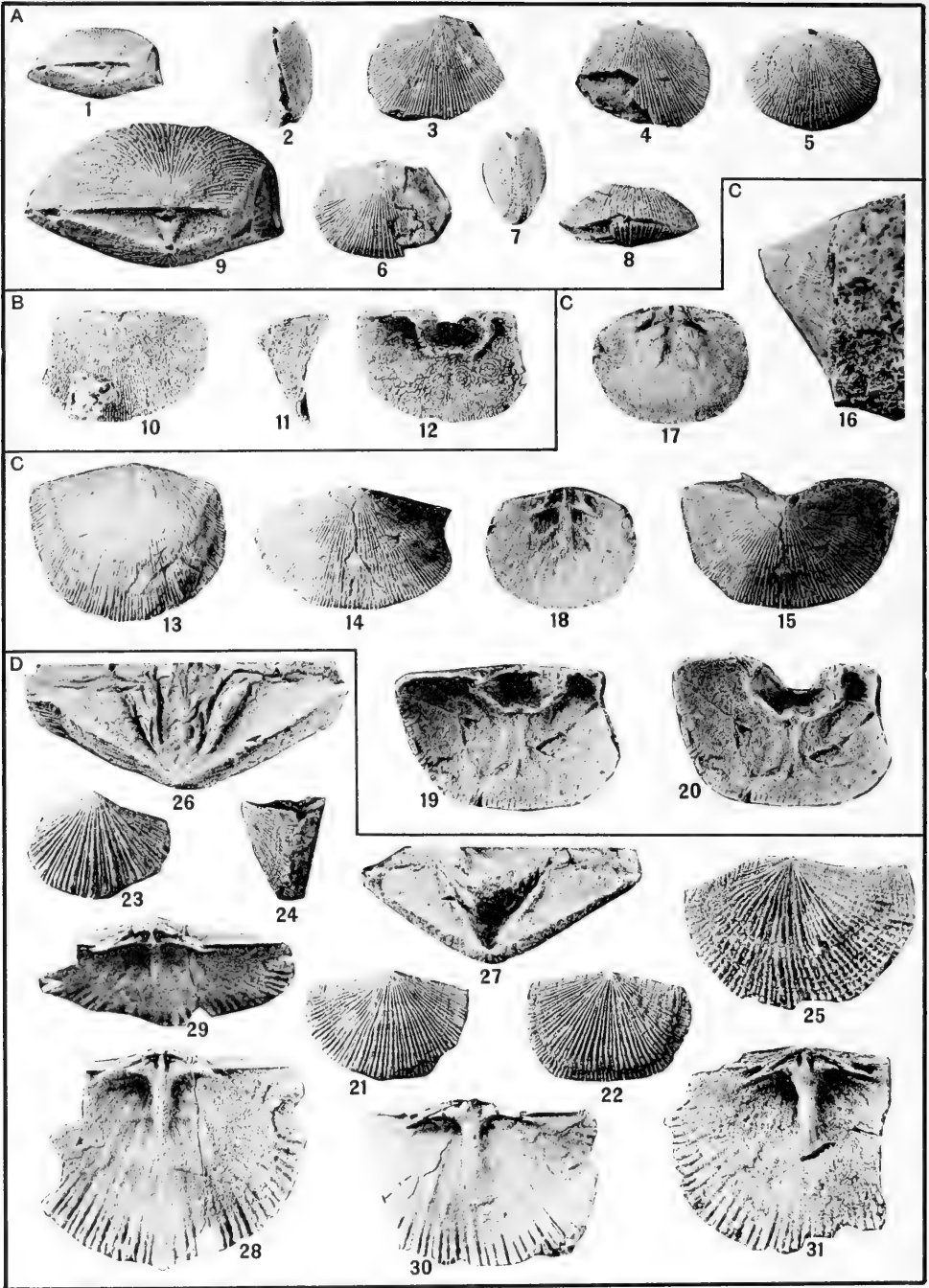
CHAULISTOMELLA, VALCOUREA

(SEE EXPLANATION OF PLATES.)



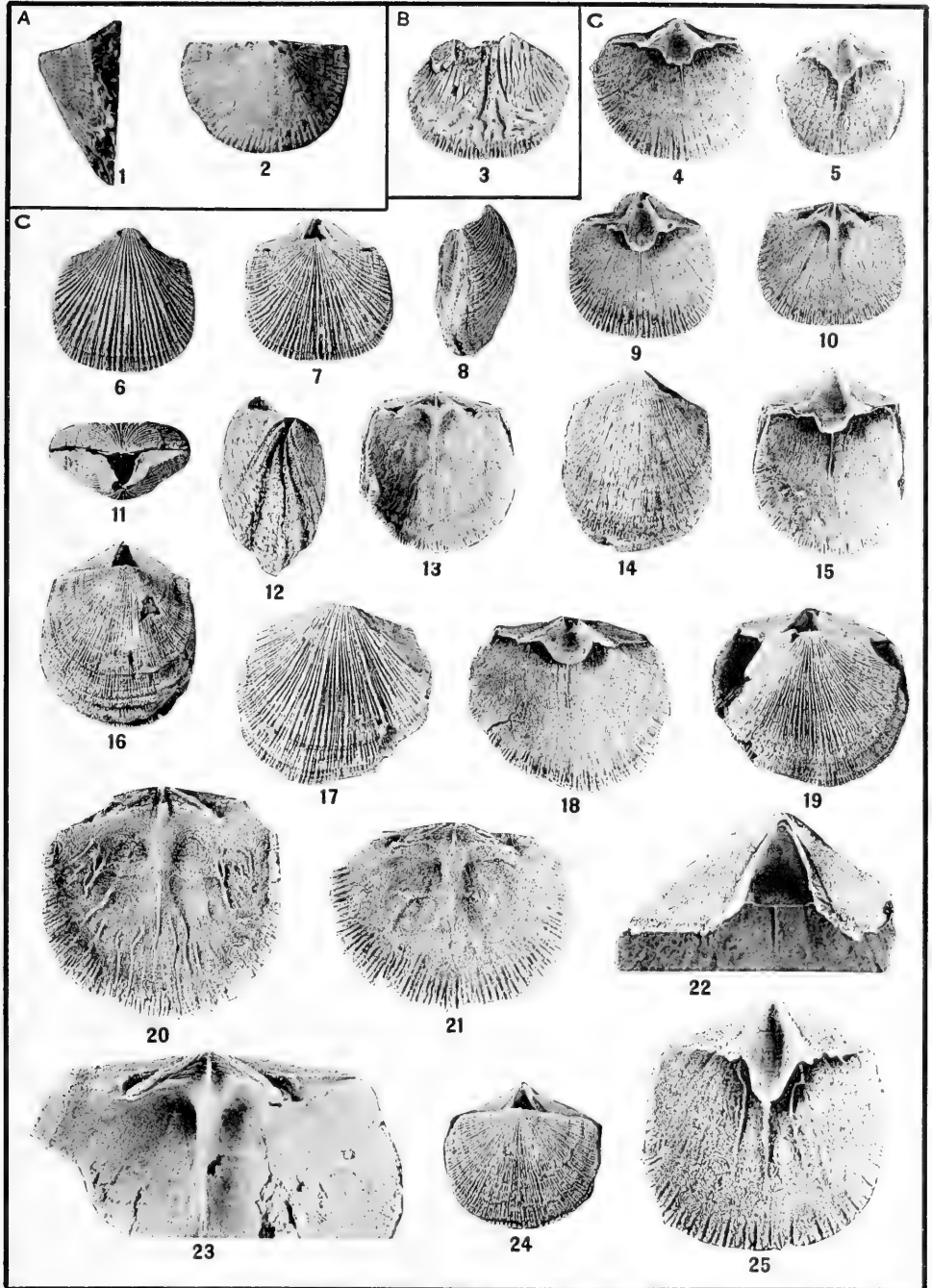


EREMOTOECHIA, TRITOECHIA  
(SEE EXPLANATION OF PLATES.)



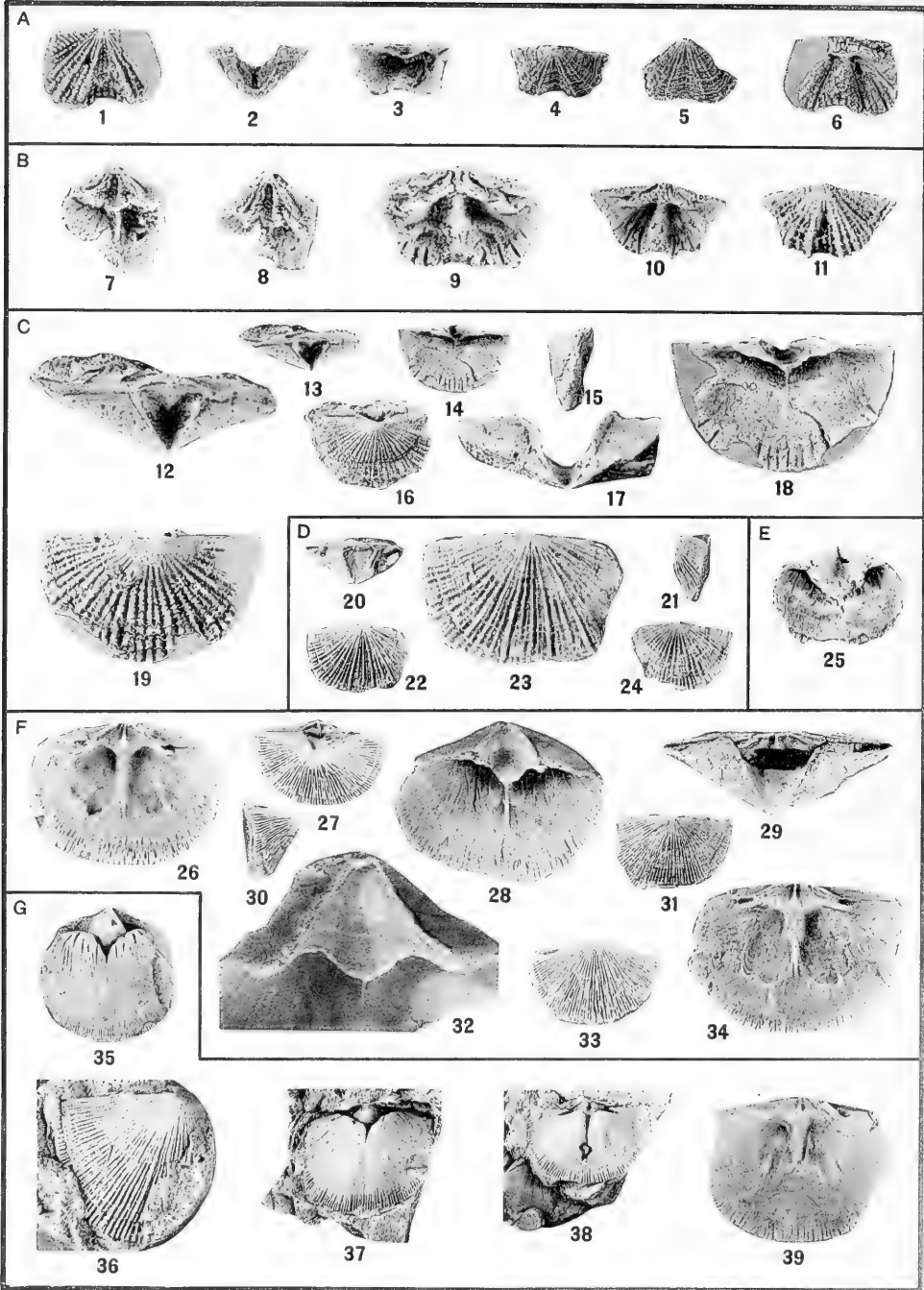
ANOMALORTHIS, ATELELASMA, EREMOTOECHIA

(SEE EXPLANATION OF PLATES.)

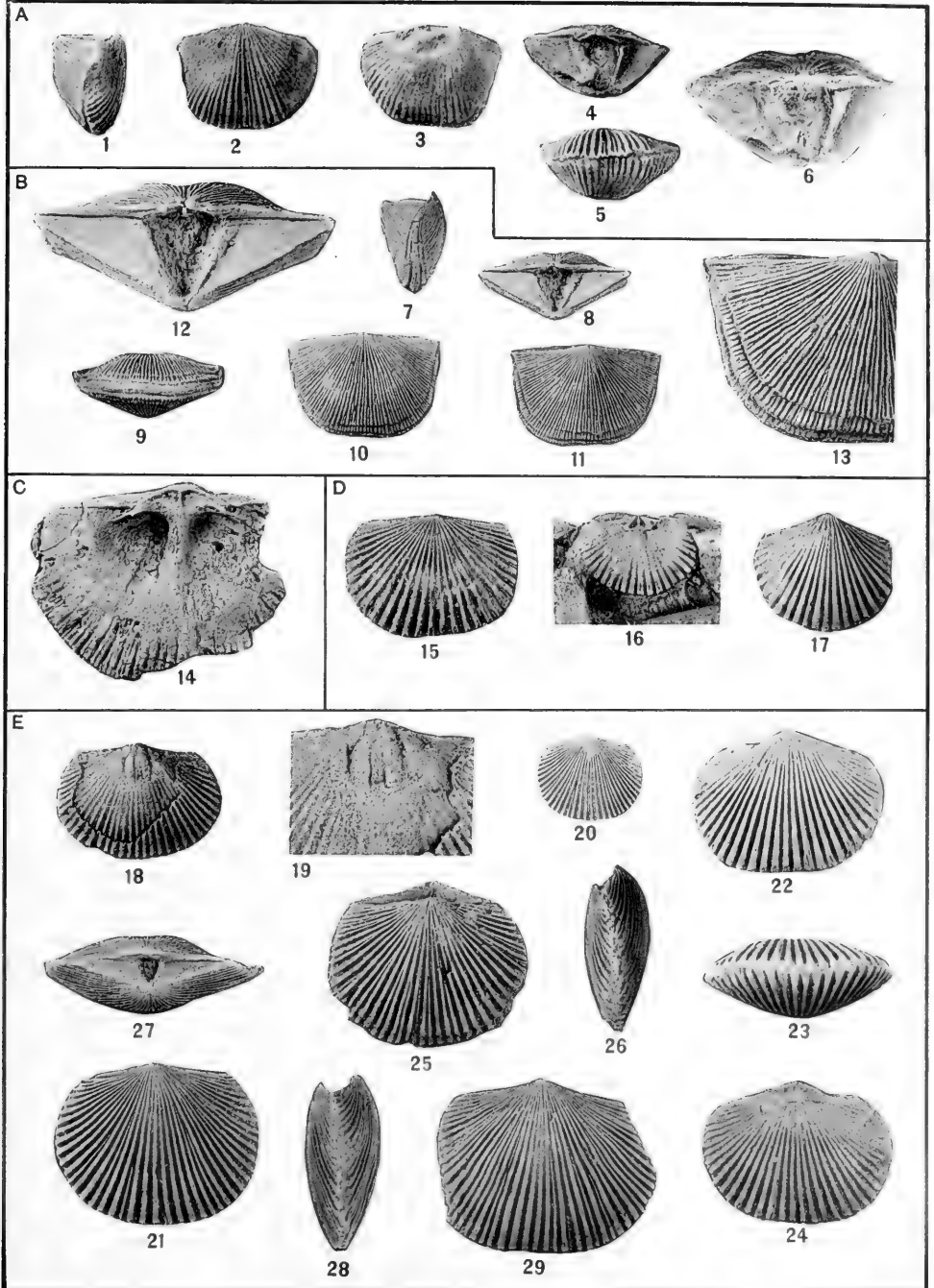


**ATELELASMA**

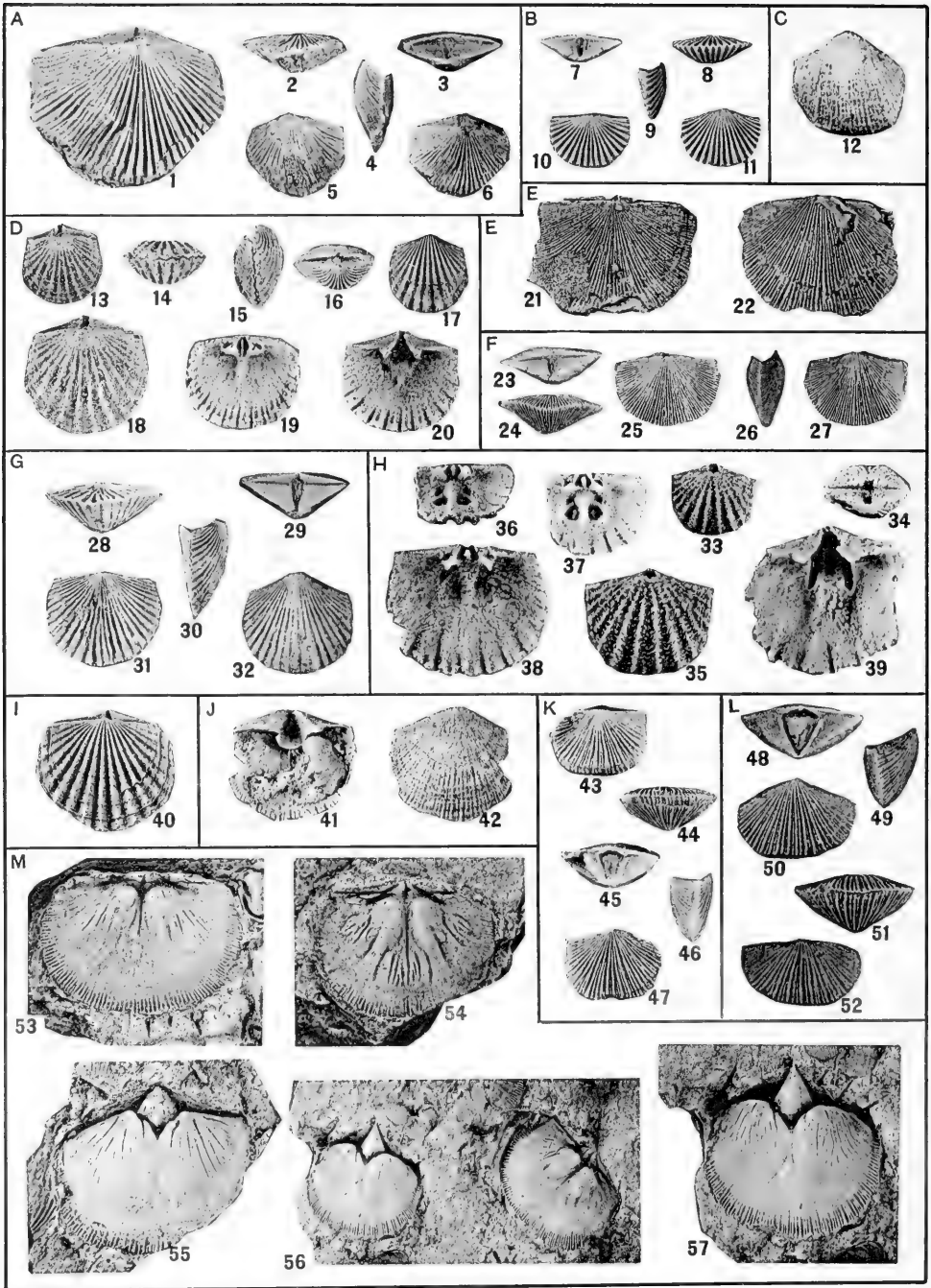
(SEE EXPLANATION OF PLATES.)



ATELELASMA, KULLERVO  
(SEE EXPLANATION OF PLATES.)

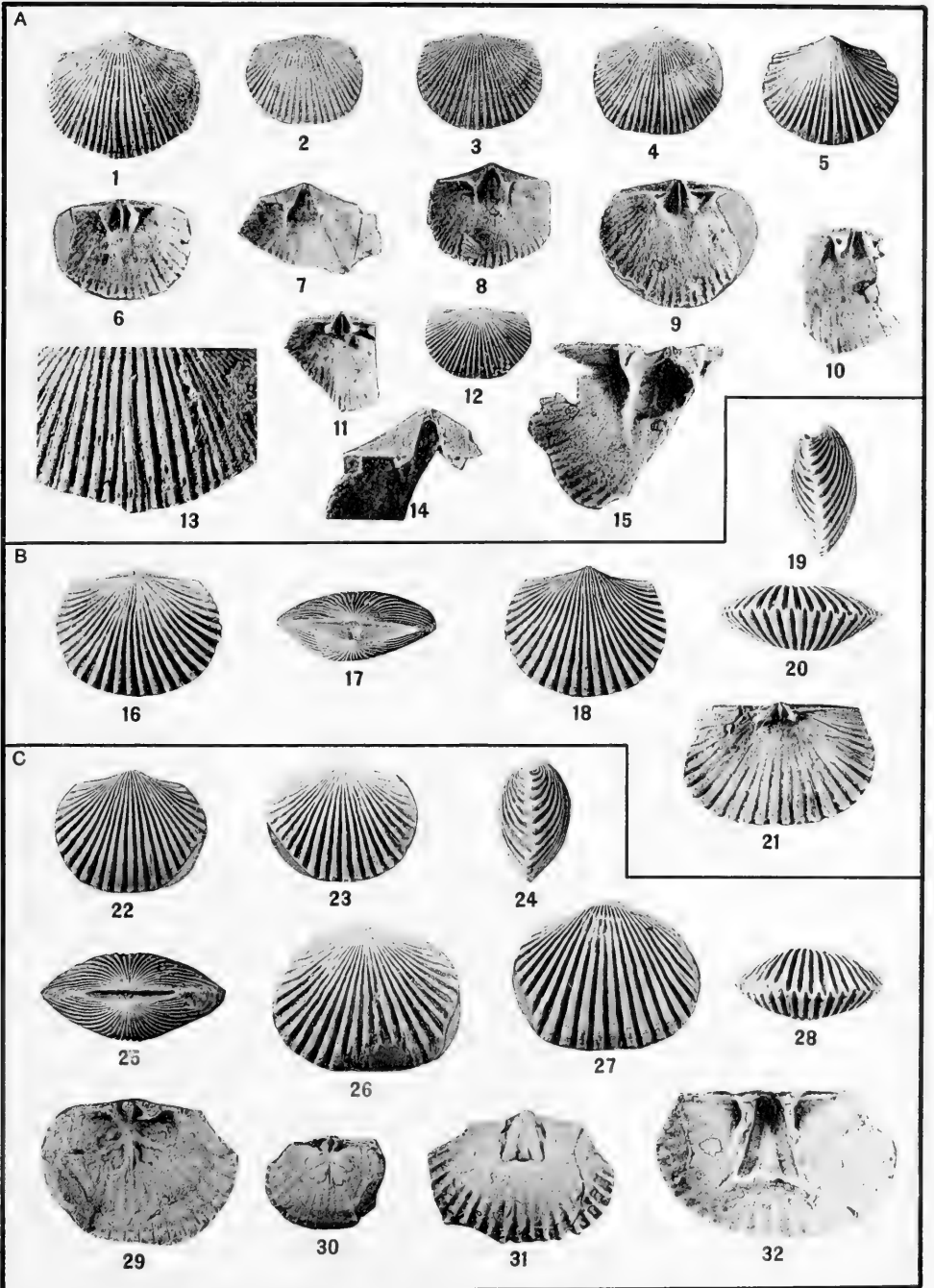


ATELELASMA, PLECTORTHIS  
(SEE EXPLANATION OF PLATES.)

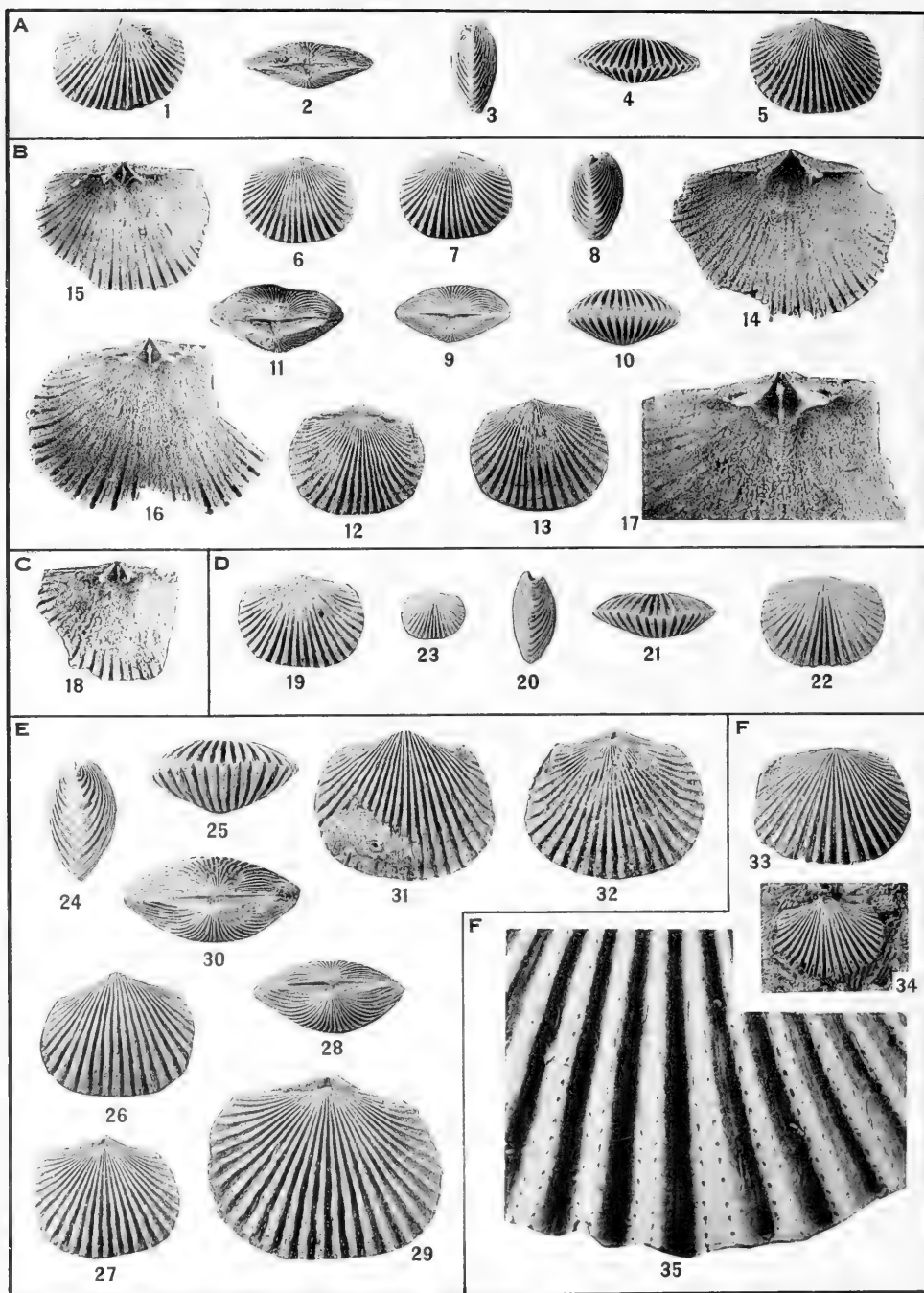


ATELELASMA, CYRTONOTELLA, HESPERORTHIS, ORTHAMBONITES, PIONODEMA,  
PRODUCTORTHIS, PTYCHOPLEURELLA

(SEE EXPLANATION OF PLATES.)



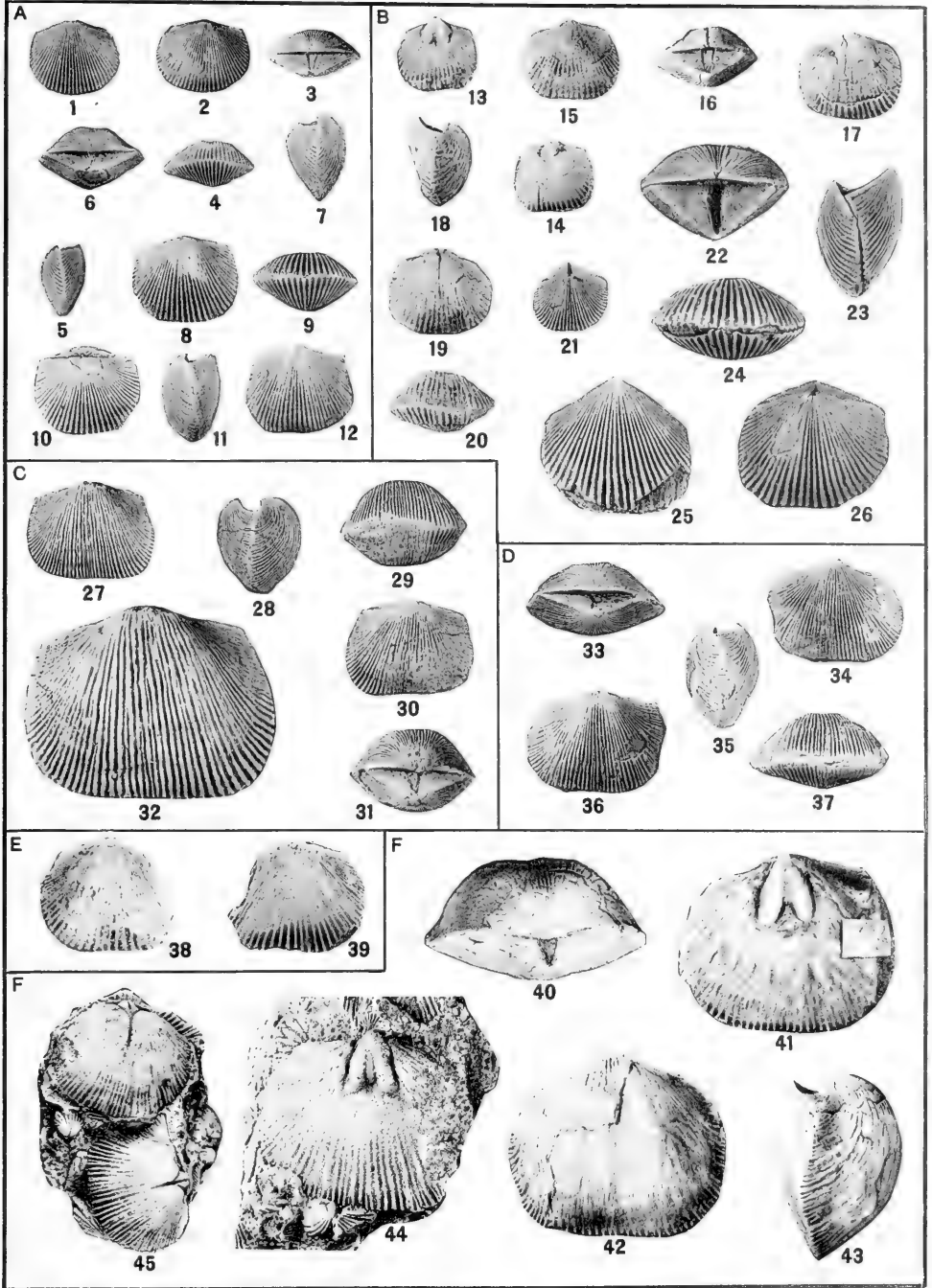
DESMORTHIS, PLECTORTHIS  
(SEE EXPLANATION OF PLATES.)



PLECTORTHIS

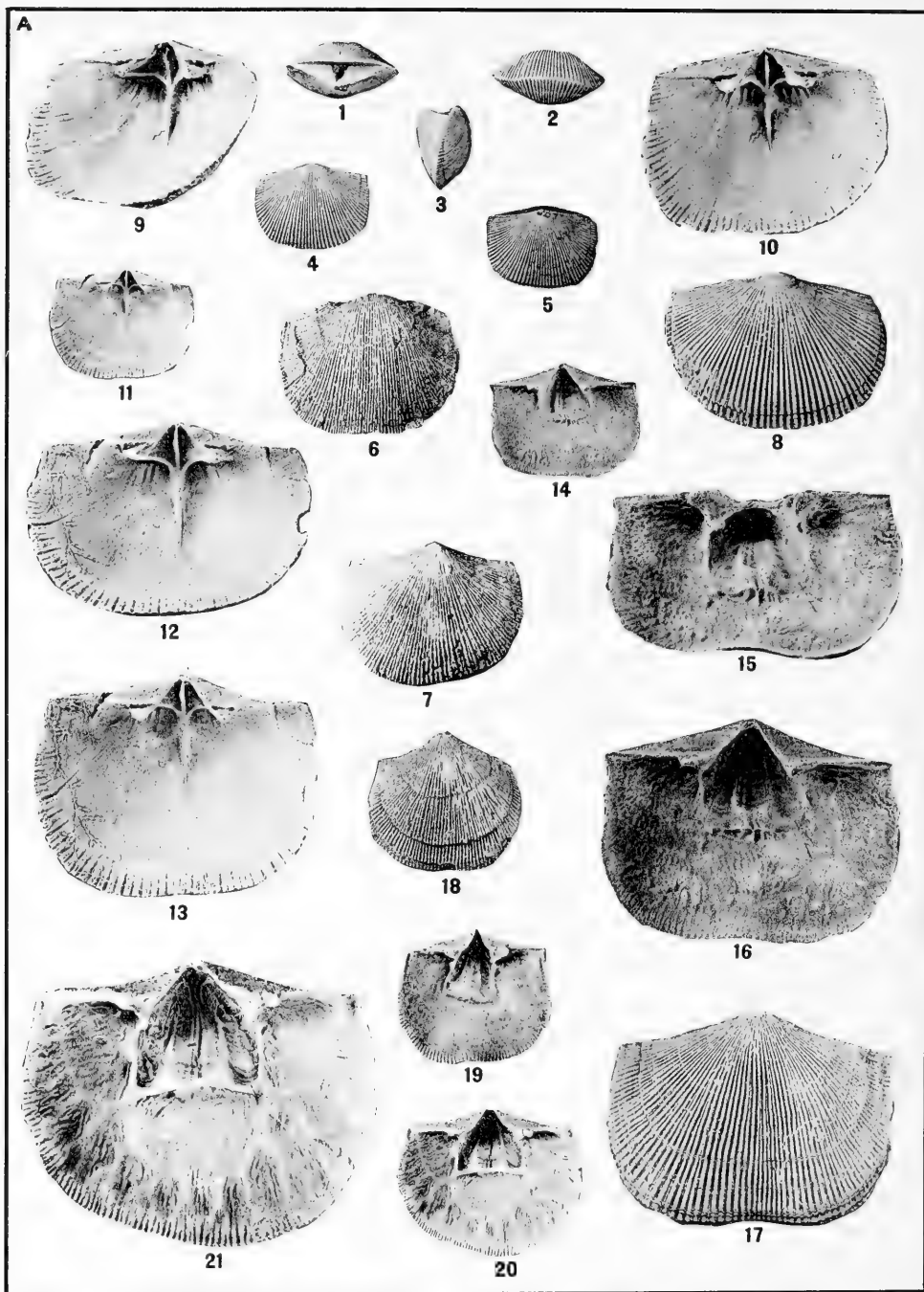
(SEE EXPLANATION OF PLATES.)





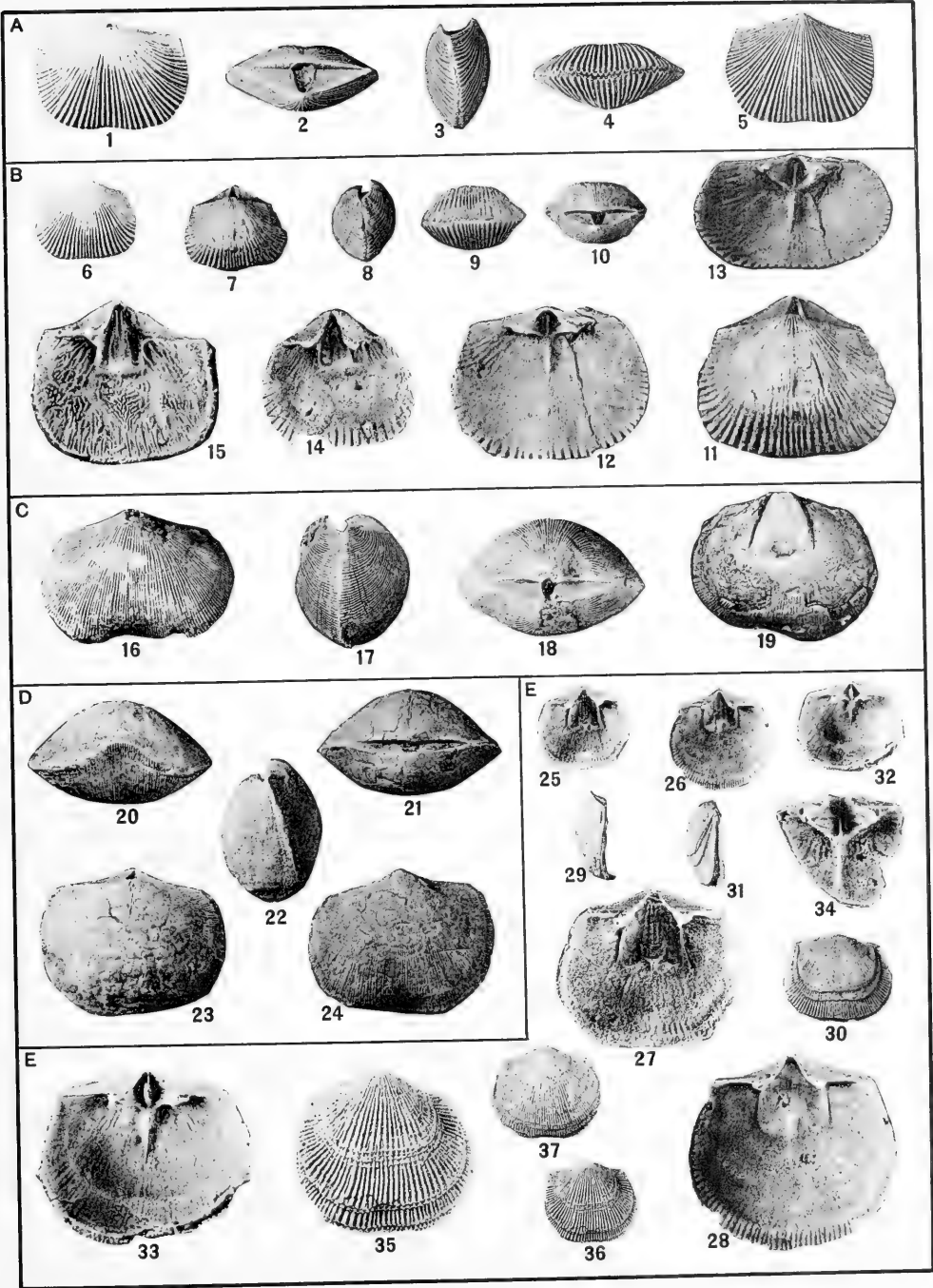
MIMELLA

(SEE EXPLANATION OF PLATES.)



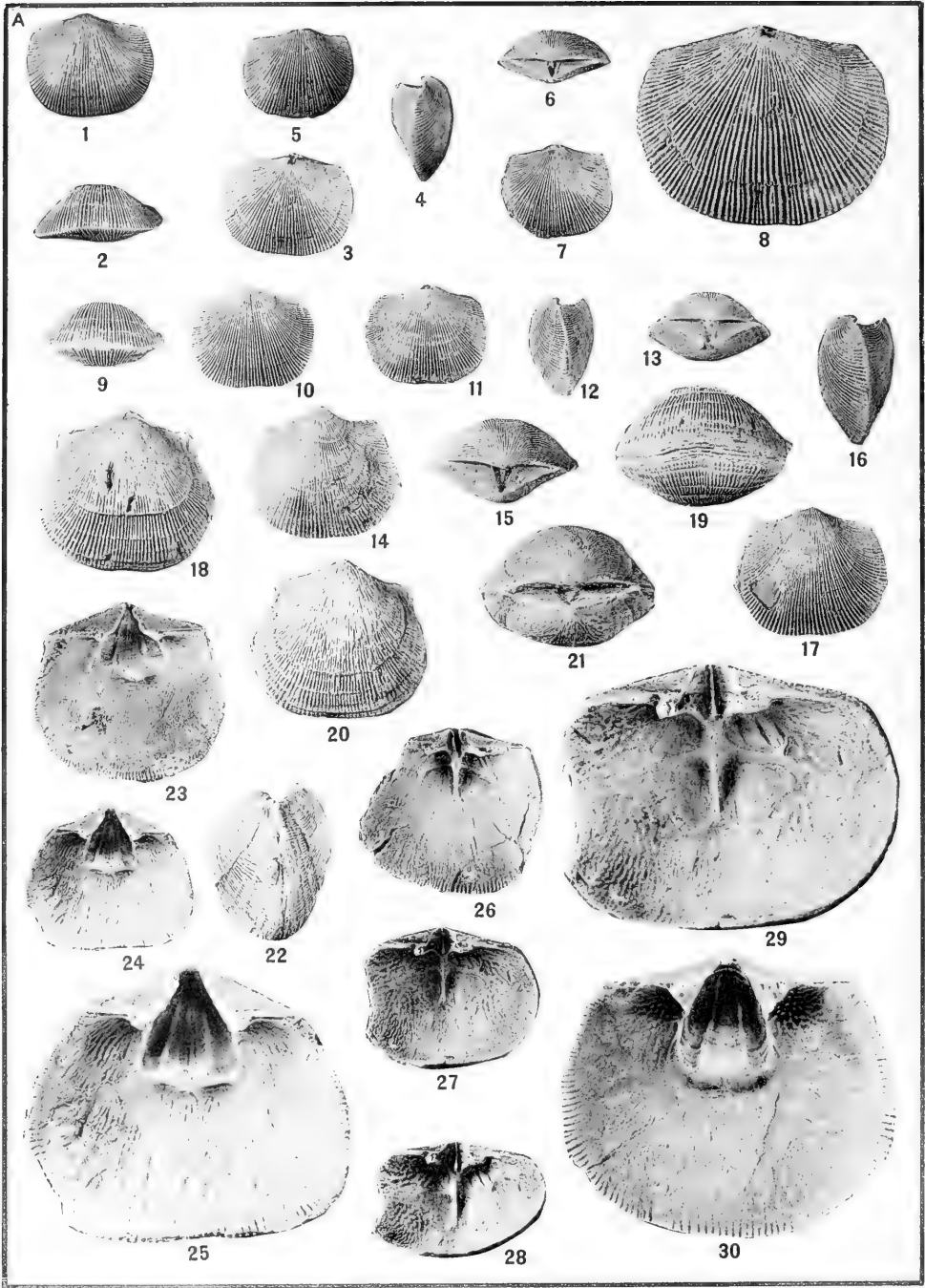
MIMELLA

(SEE EXPLANATION OF PLATES.)



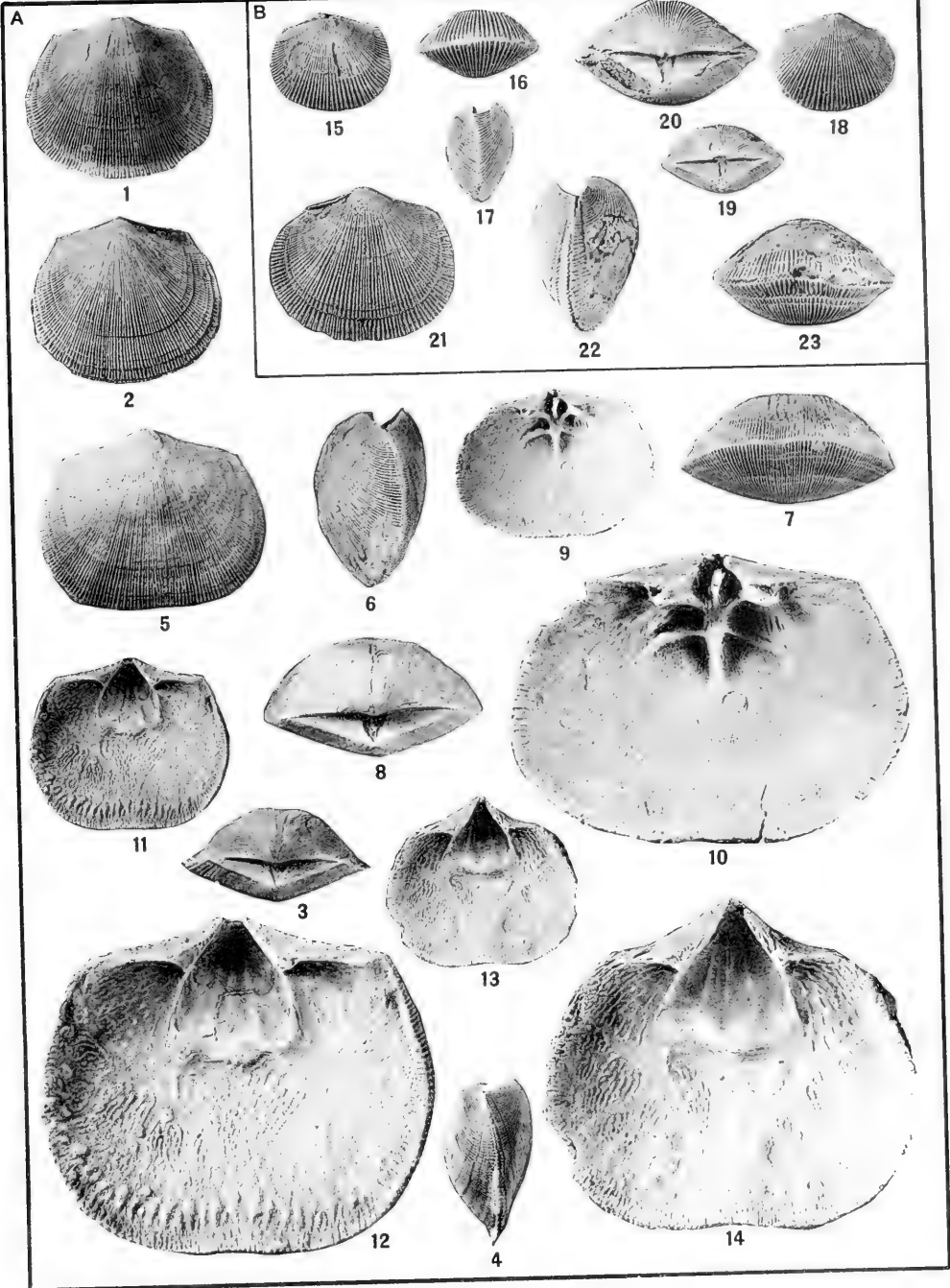
MIMELLA

(SEE EXPLANATION OF PLATES.)



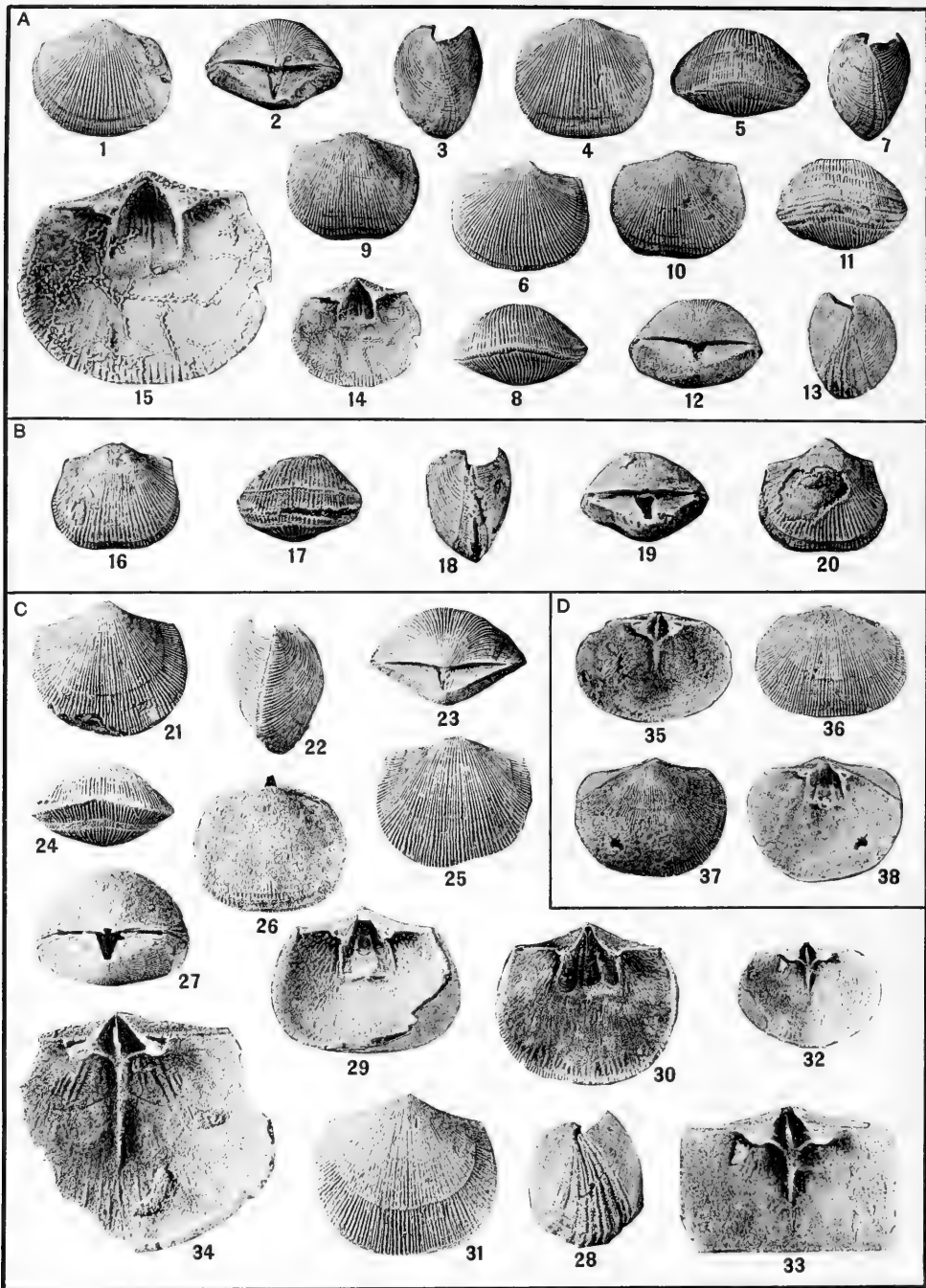
MIMELLA

(SEE EXPLANATION OF PLATES.)



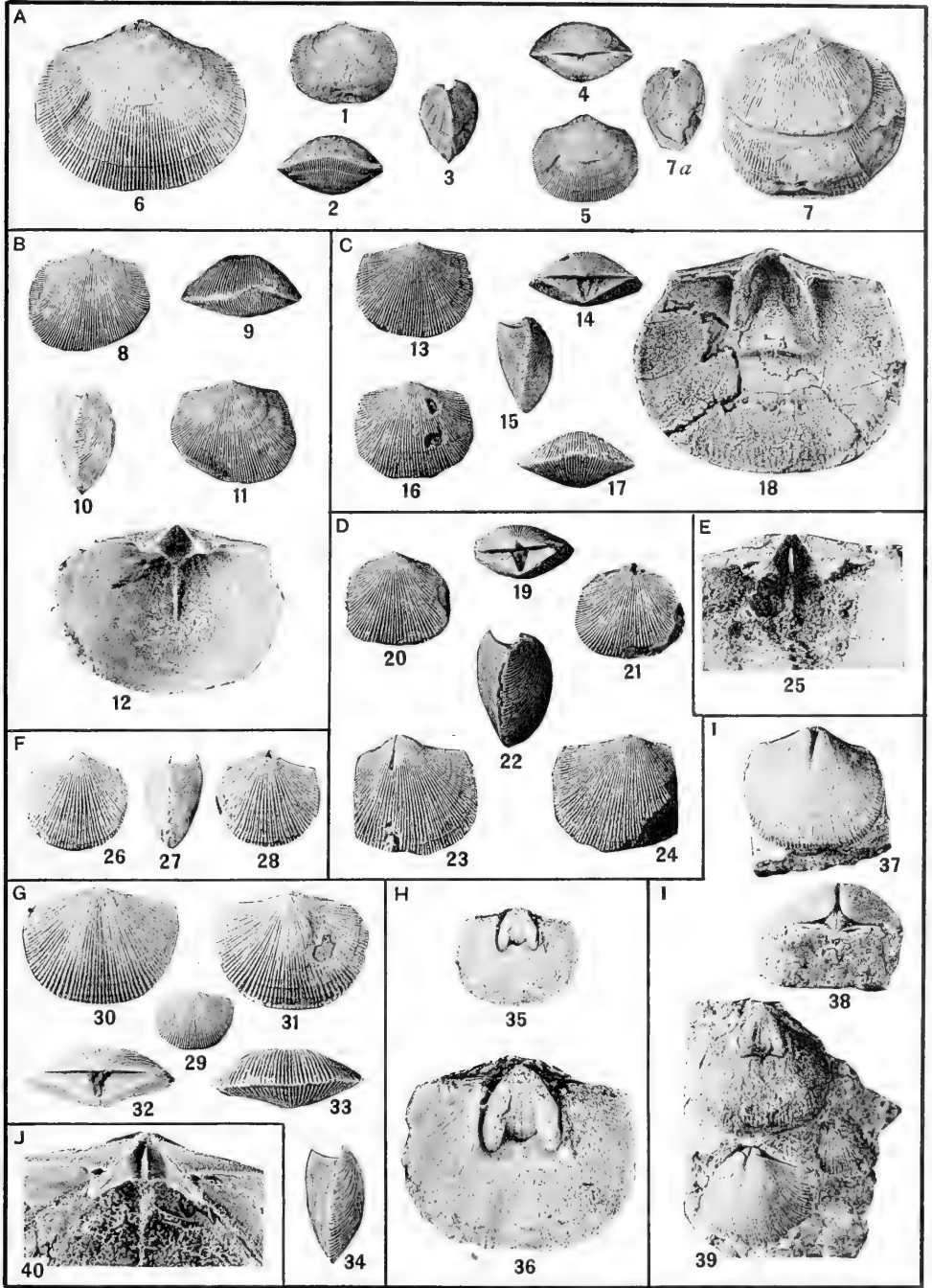
MIMELLA

(SEE EXPLANATION OF PLATES.)



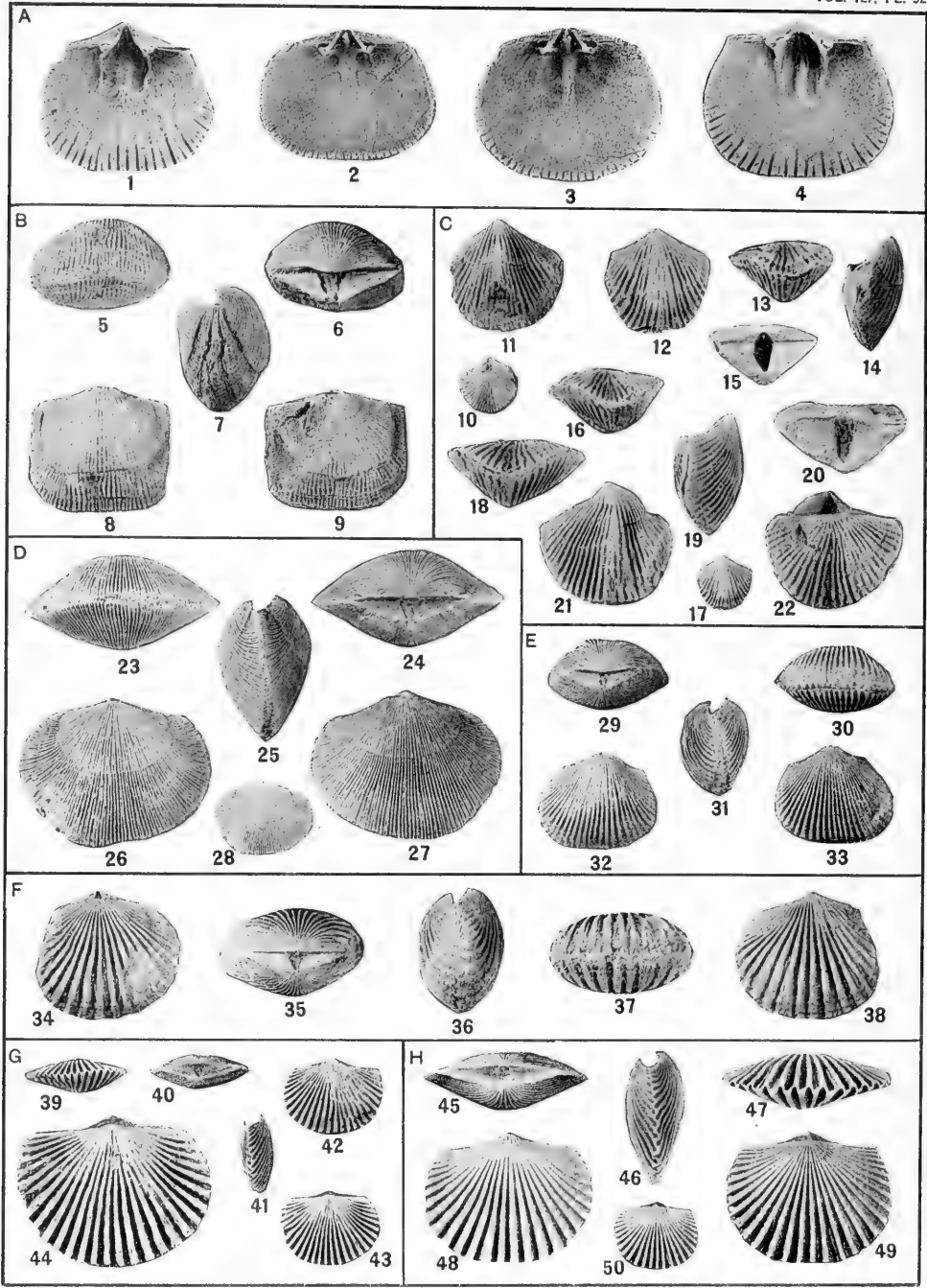
MIMELLA

(SEE EXPLANATION OF PLATES.)



MIMELLA

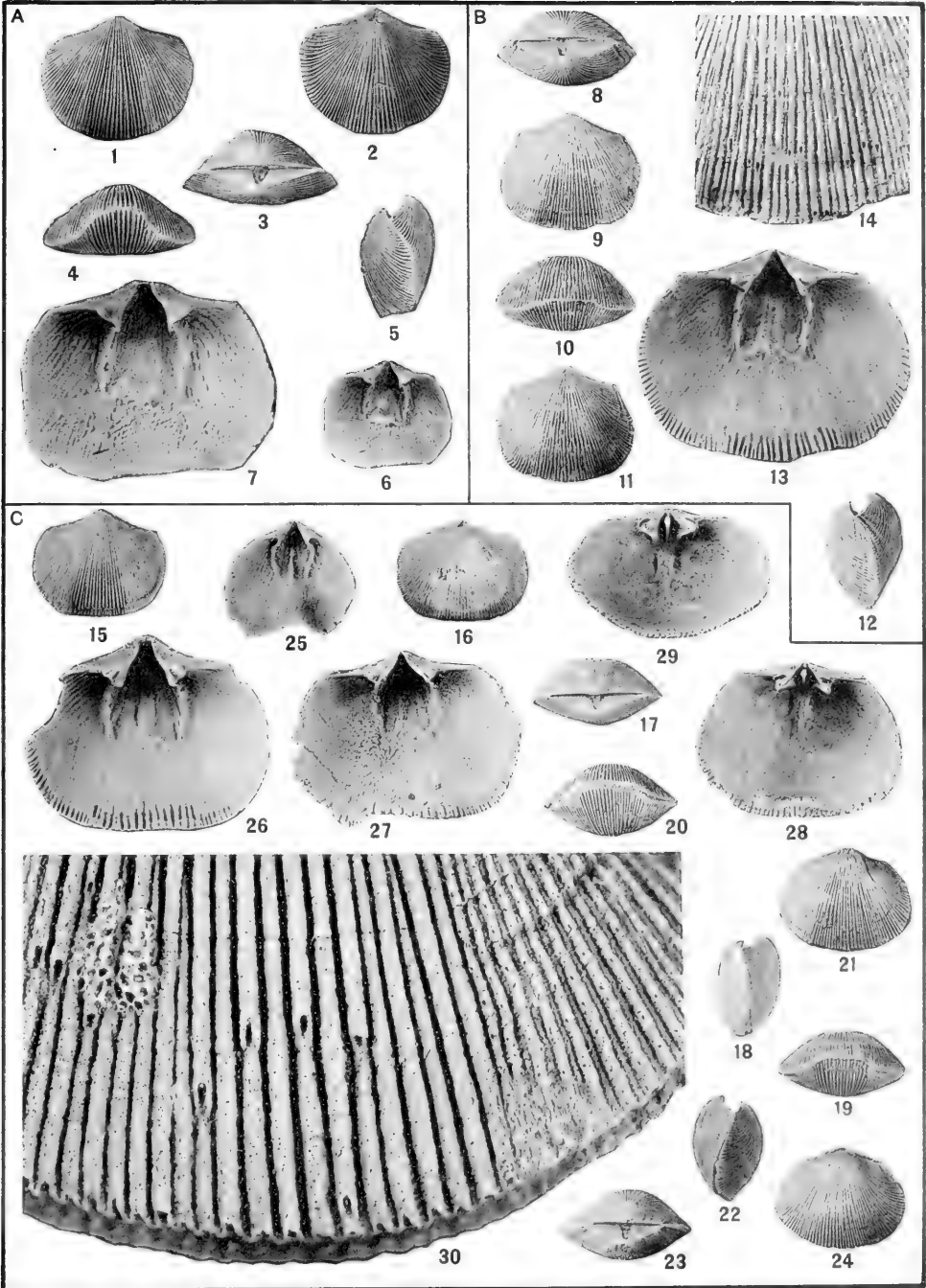
(SEE EXPLANATION OF PLATES.)



DOLEROIDES, MIMELLA, PLECTORTHIS, SKENIDIODES

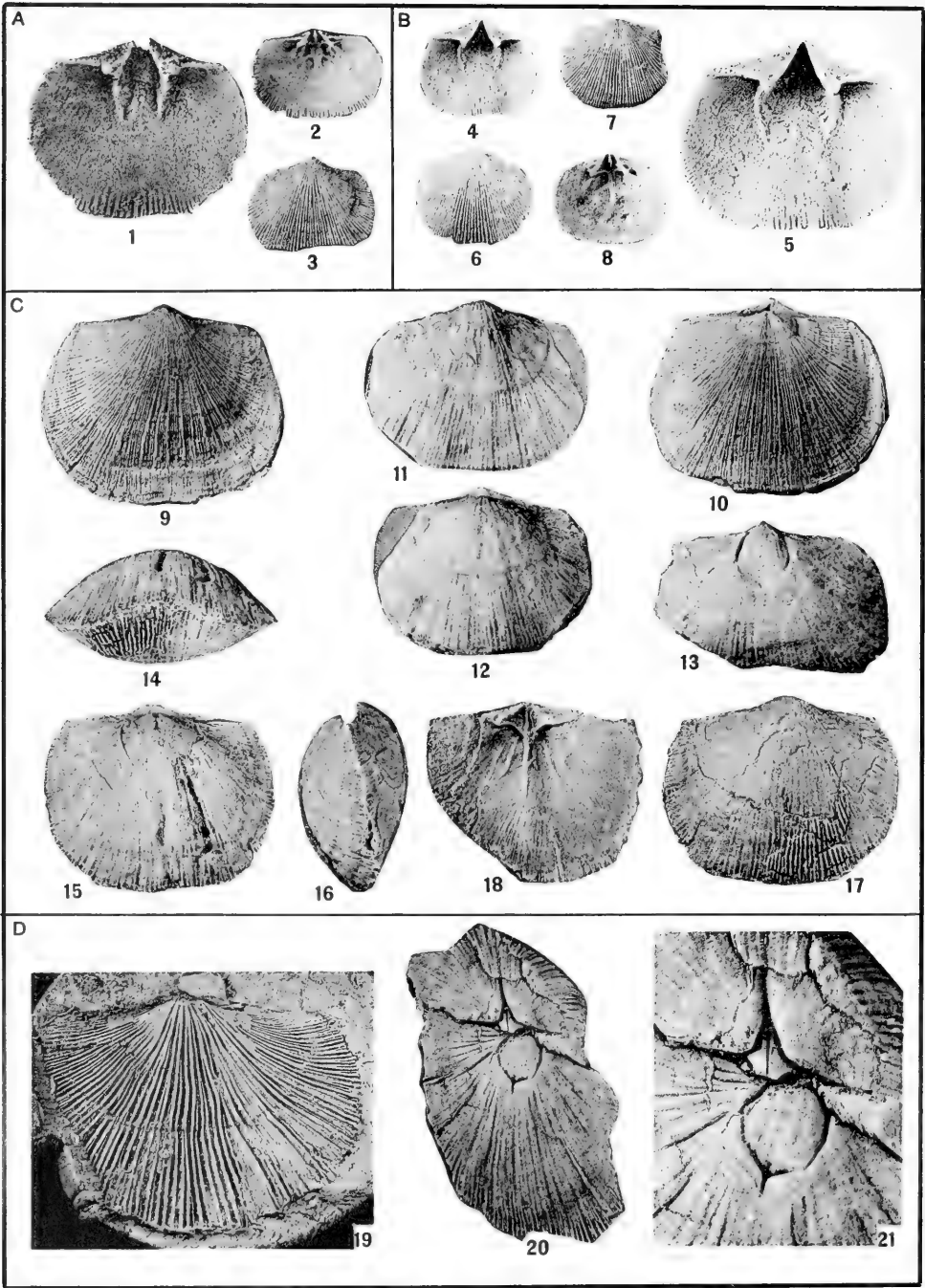
(SEE EXPLANATION OF PLATES.)





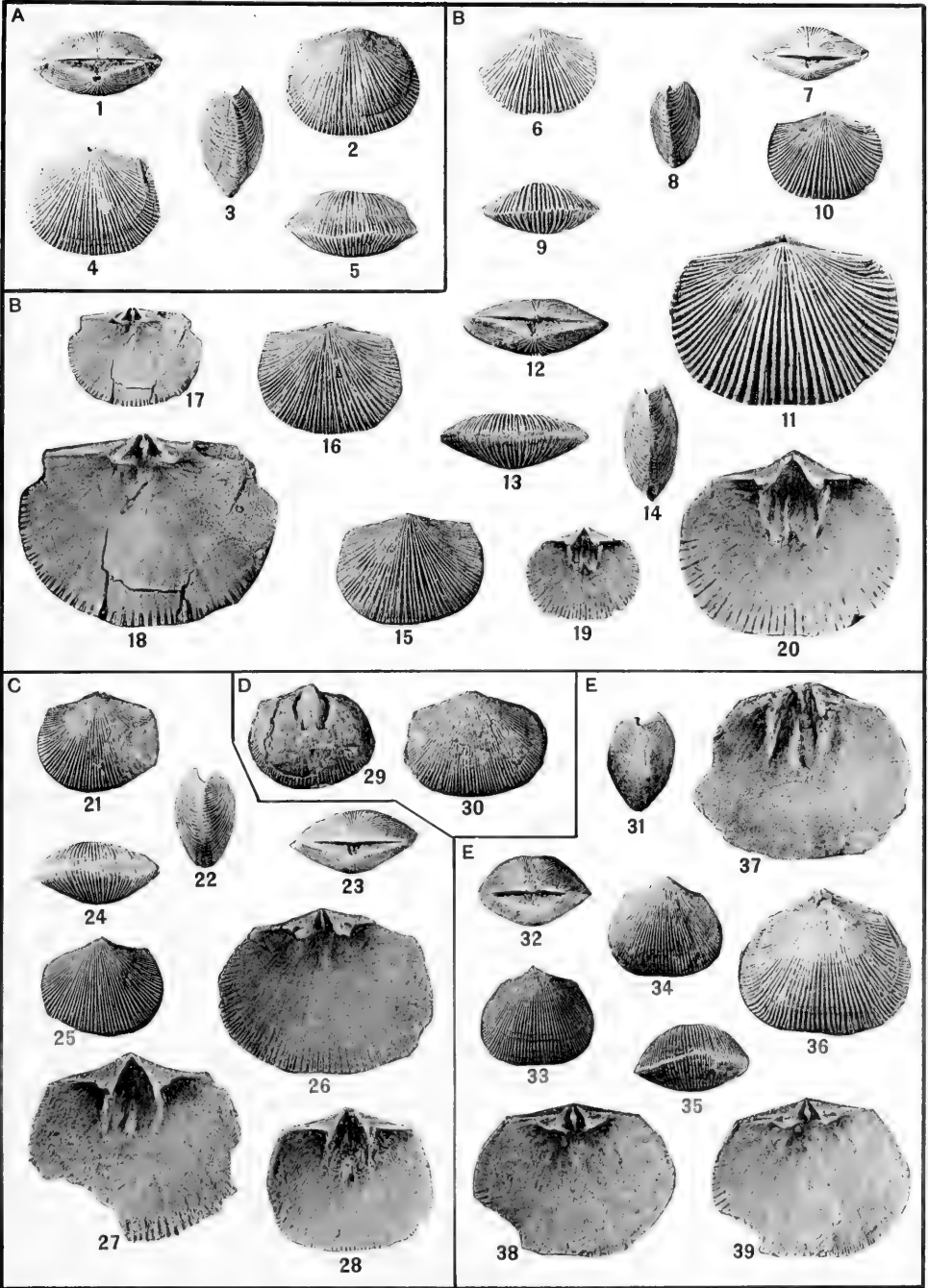
DOLEROIDES

(SEE EXPLANATION OF PLATES.)



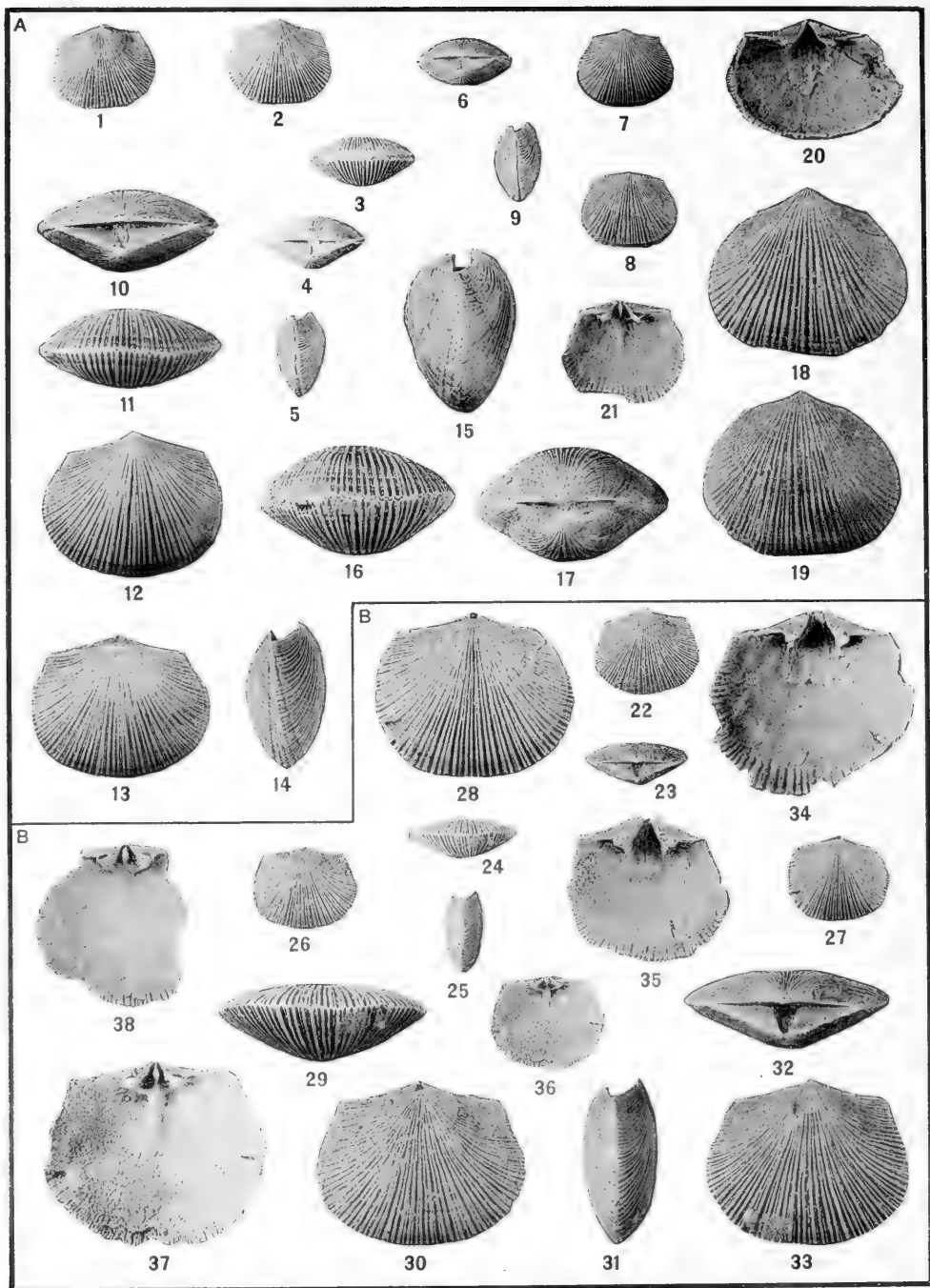
DOLEROIDES

(SEE EXPLANATION OF PLATES.)



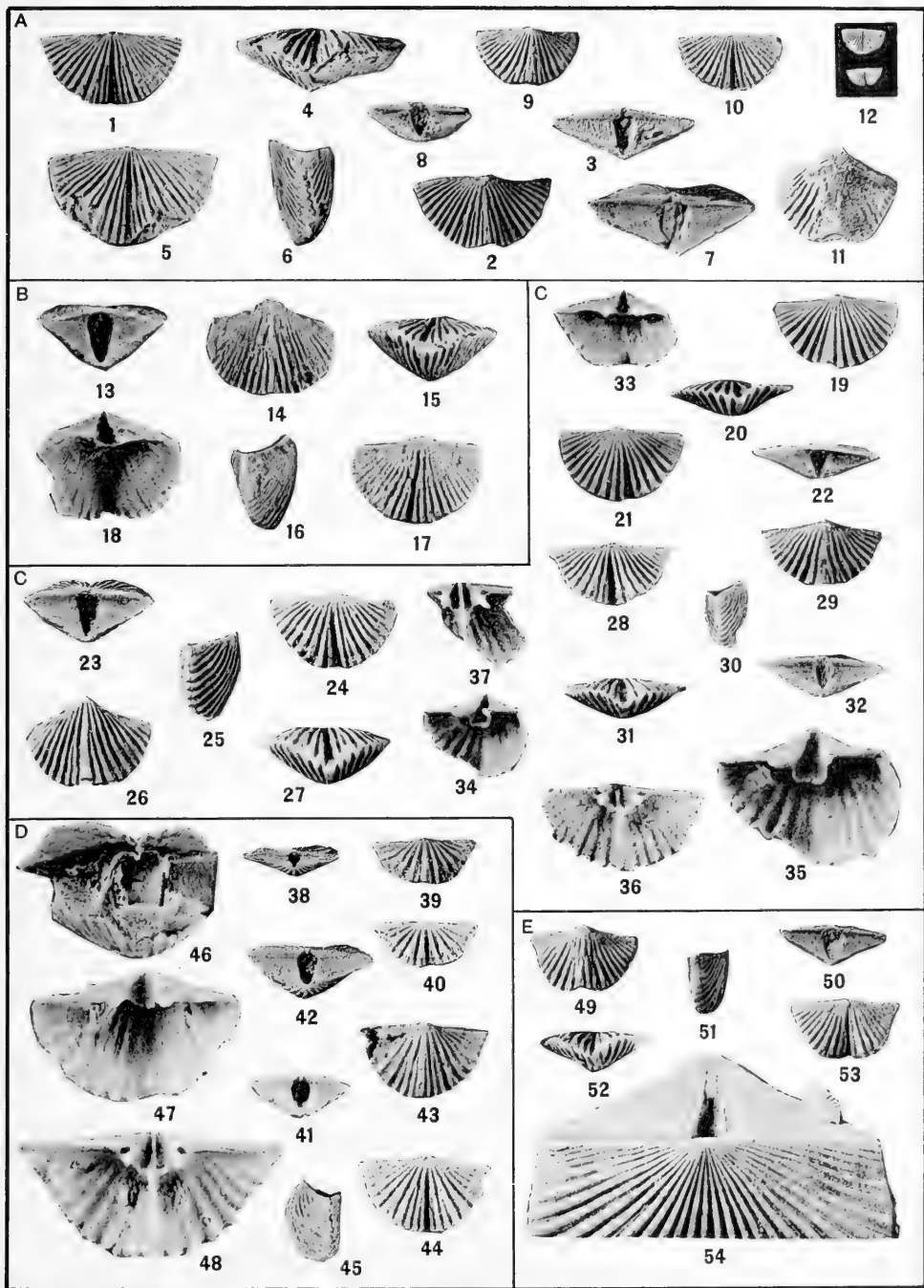
DOLEROIDES

(SEE EXPLANATION OF PLATES.)



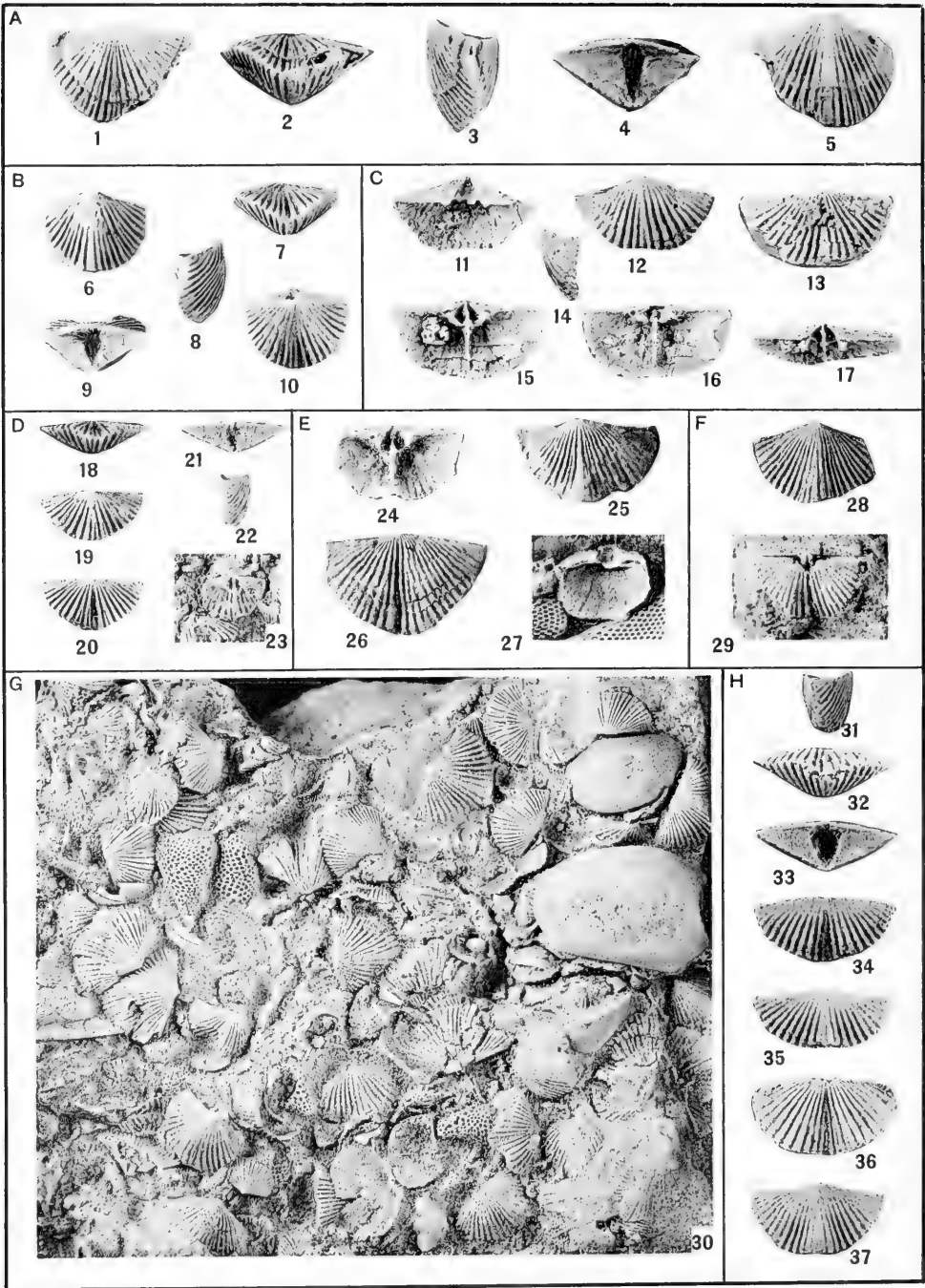
DOLEROIDES

(SEE EXPLANATION OF PLATES.)



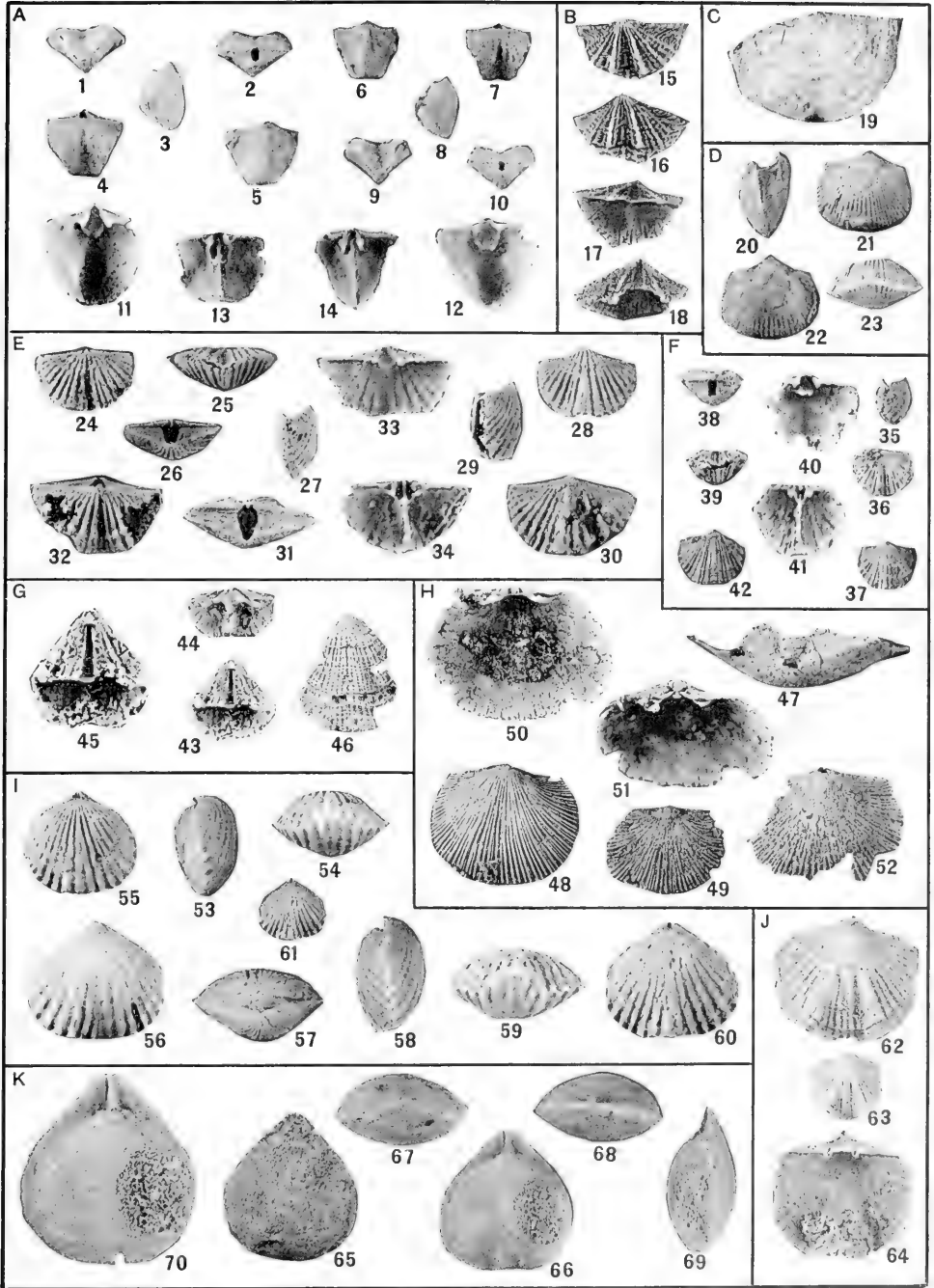
SKENIDIOIDES

(SEE EXPLANATION OF PLATES.)



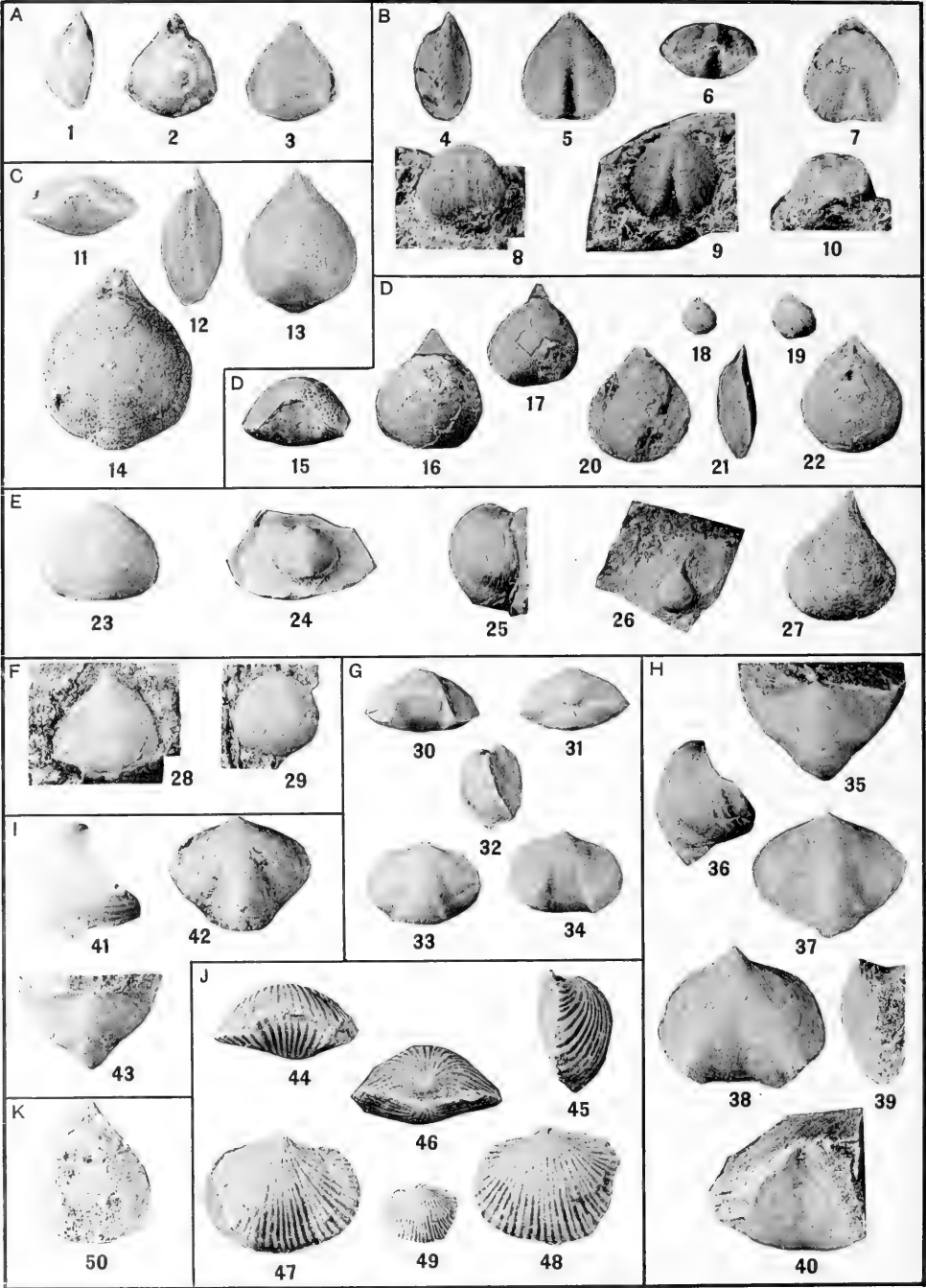
SKENIDIROIDES

(SEE EXPLANATION OF PLATES.)



ANCISTORHYNCHA, ELASMOTHYRIS, EREMOTOECHIA, GENUS & SPECIES UNDET., KULLERVO, MIMELLA, ONYCHOPLECIA, OXOPLECIA, SKENIDIROIDES, TROPIDOTHYRIS

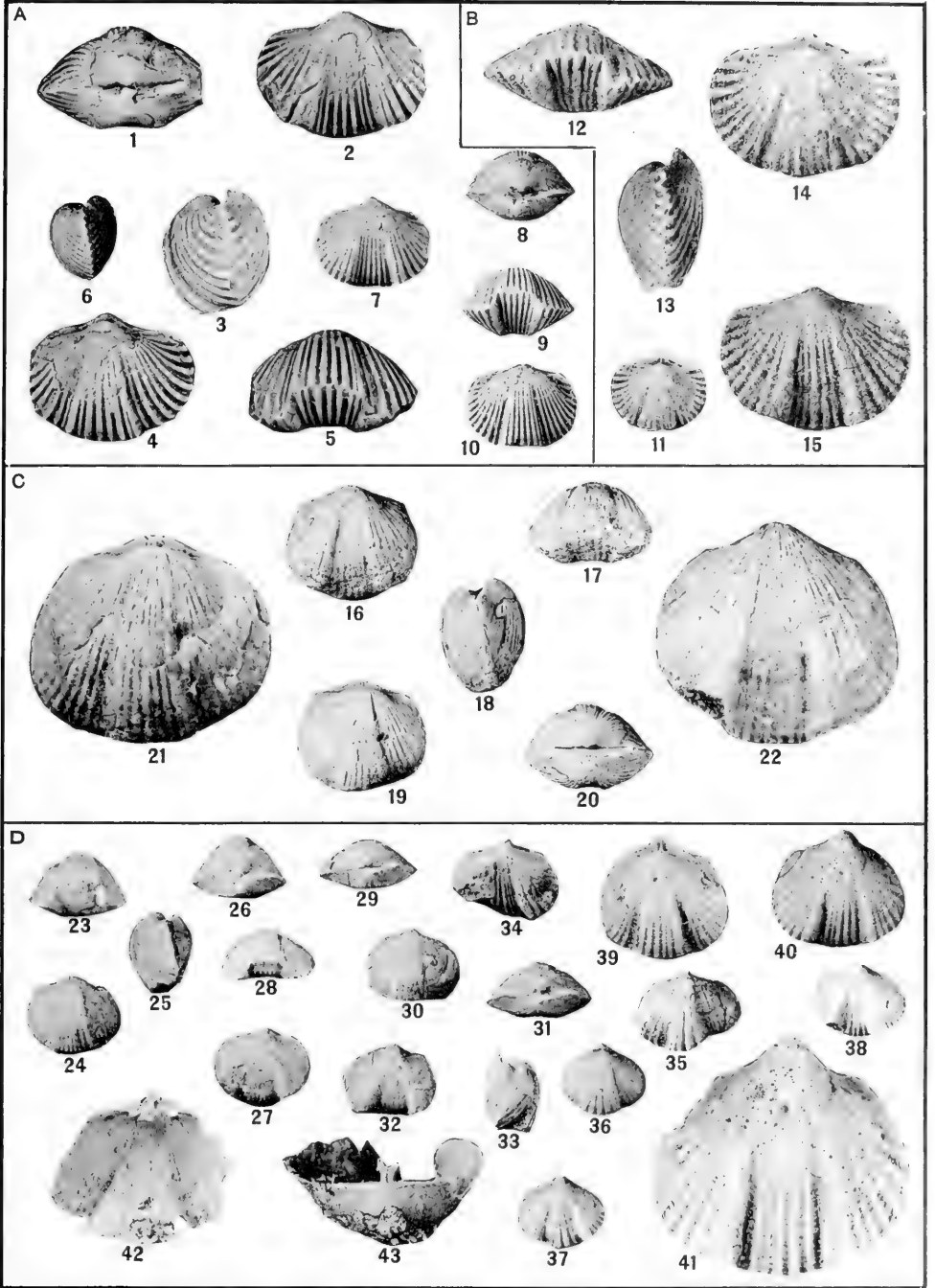
(SEE EXPLANATION OF PLATES.)



ONYCHOPLECIA, OXOPLECIA, TRIPLESIA

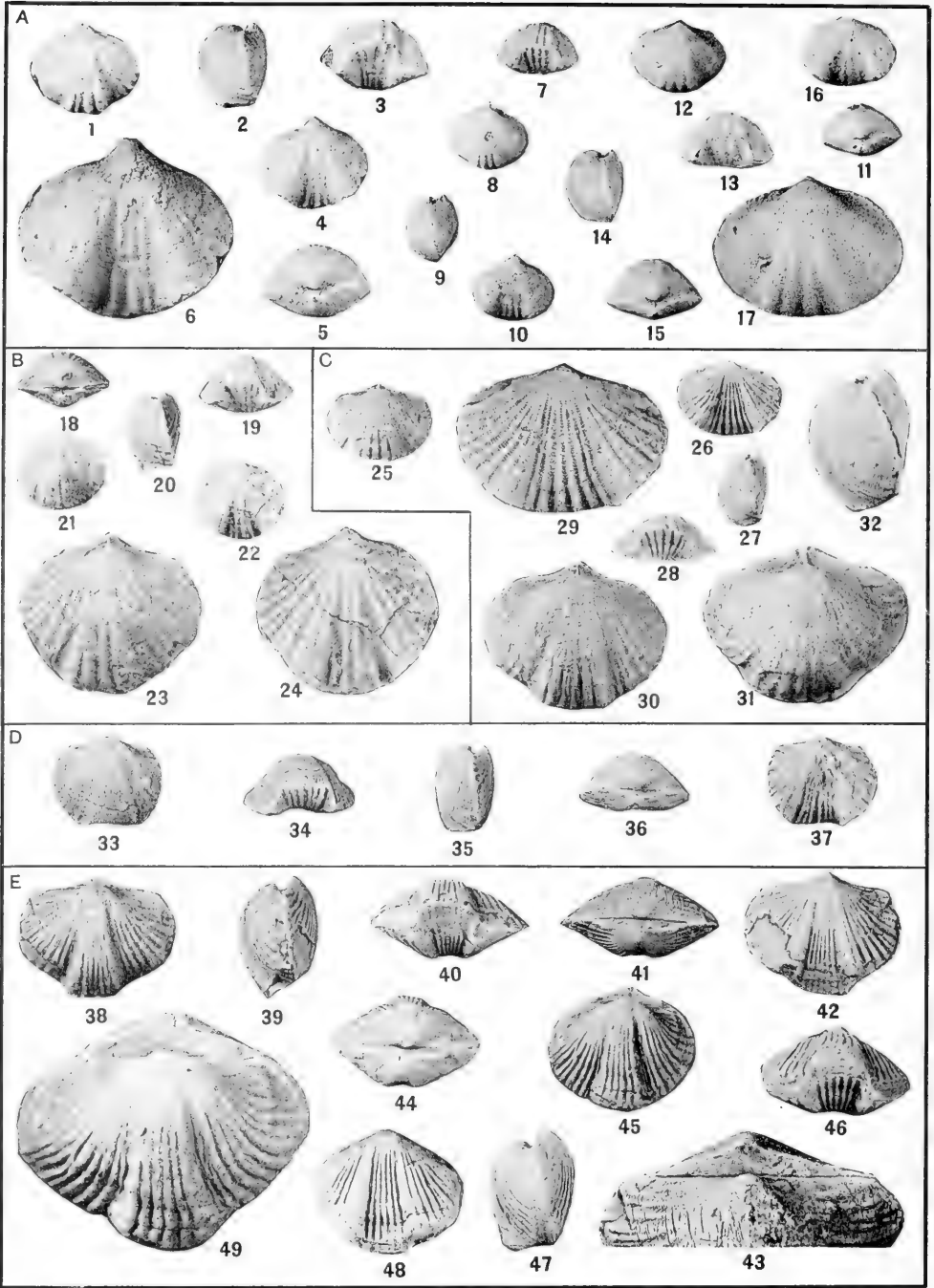
(SEE EXPLANATION OF PLATES.)





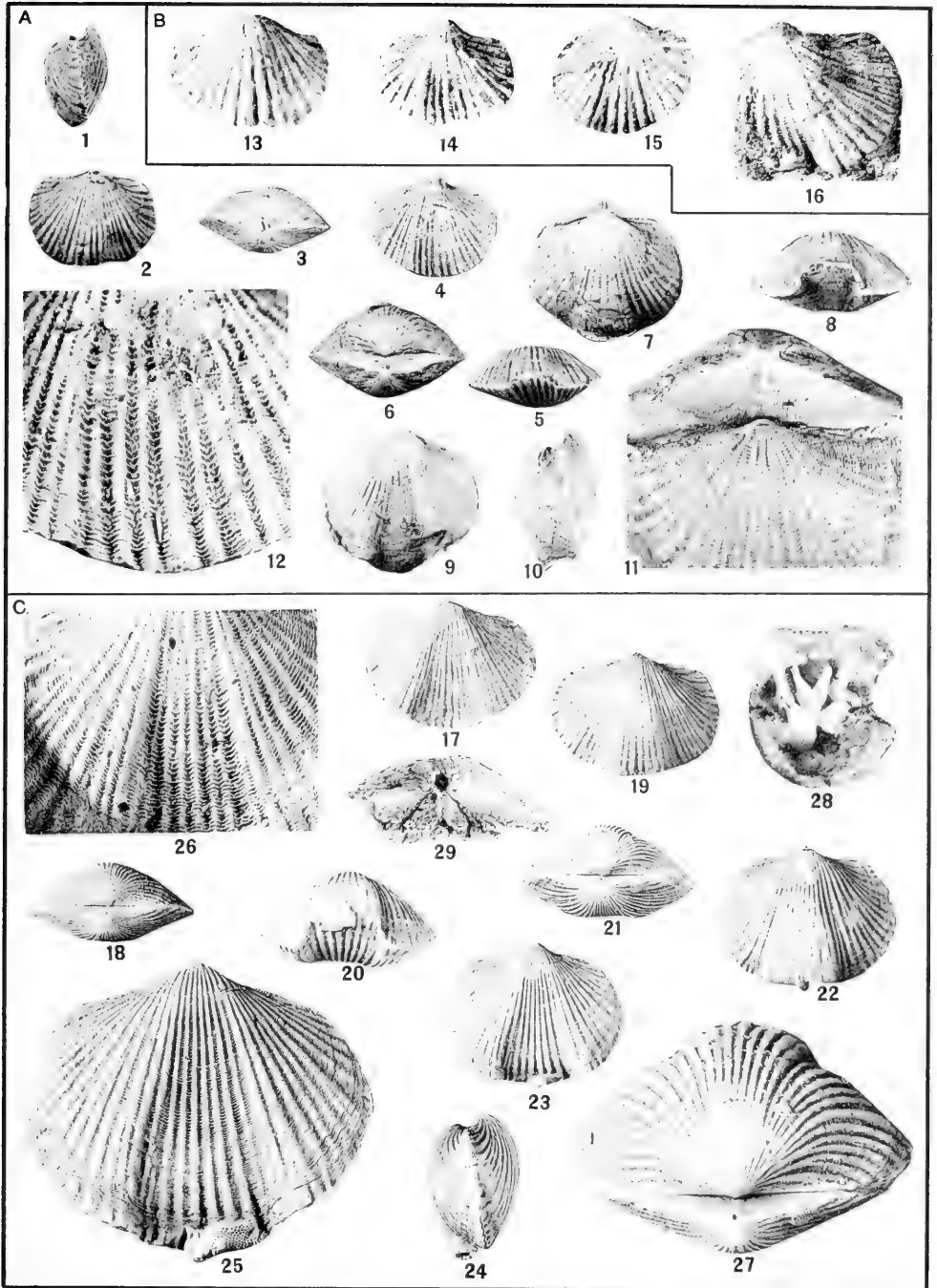
OXOPLECIA

(SEE EXPLANATION OF PLATES.)



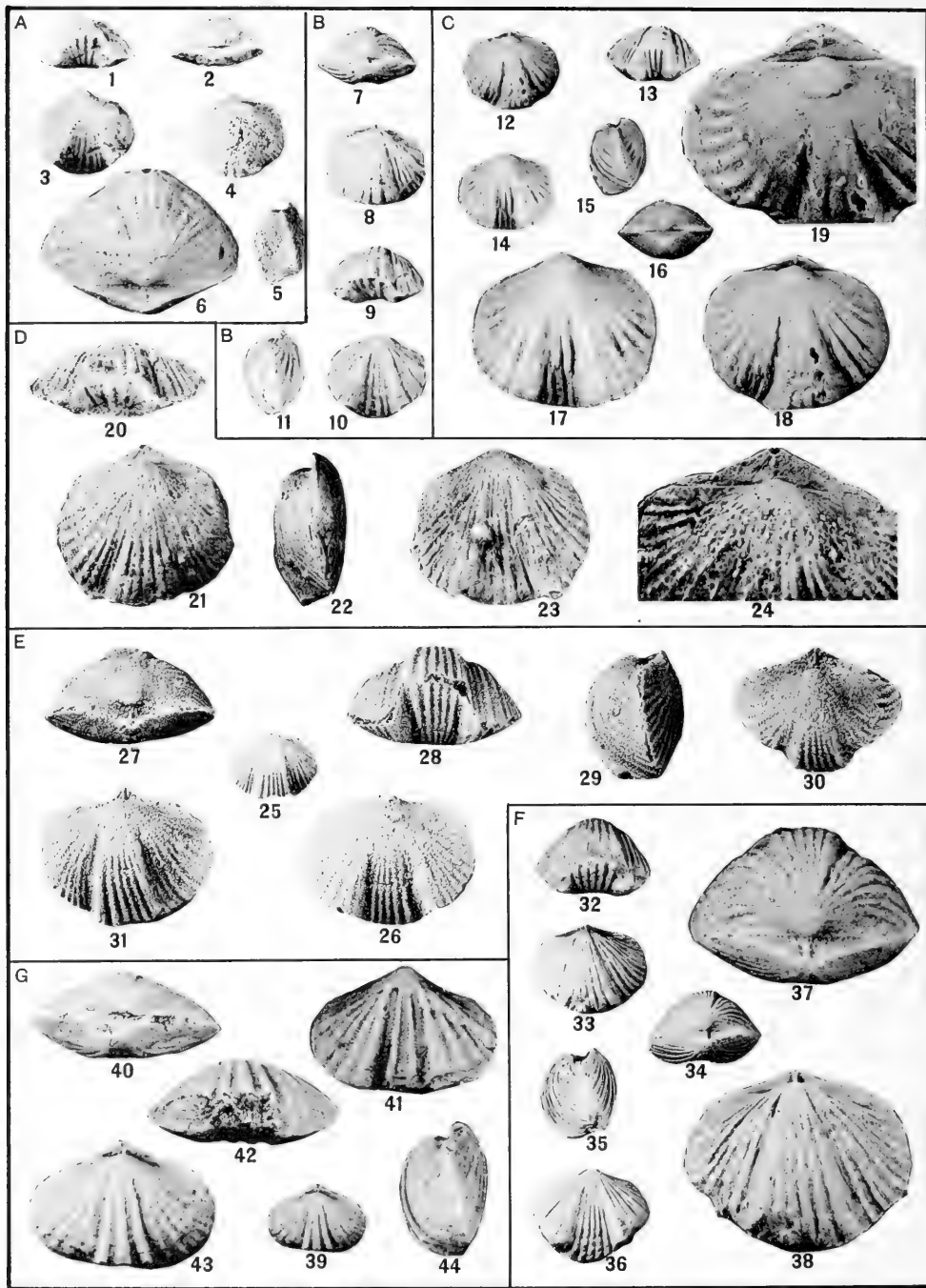
OXOPLECTIA

(SEE EXPLANATION OF PLATES.)



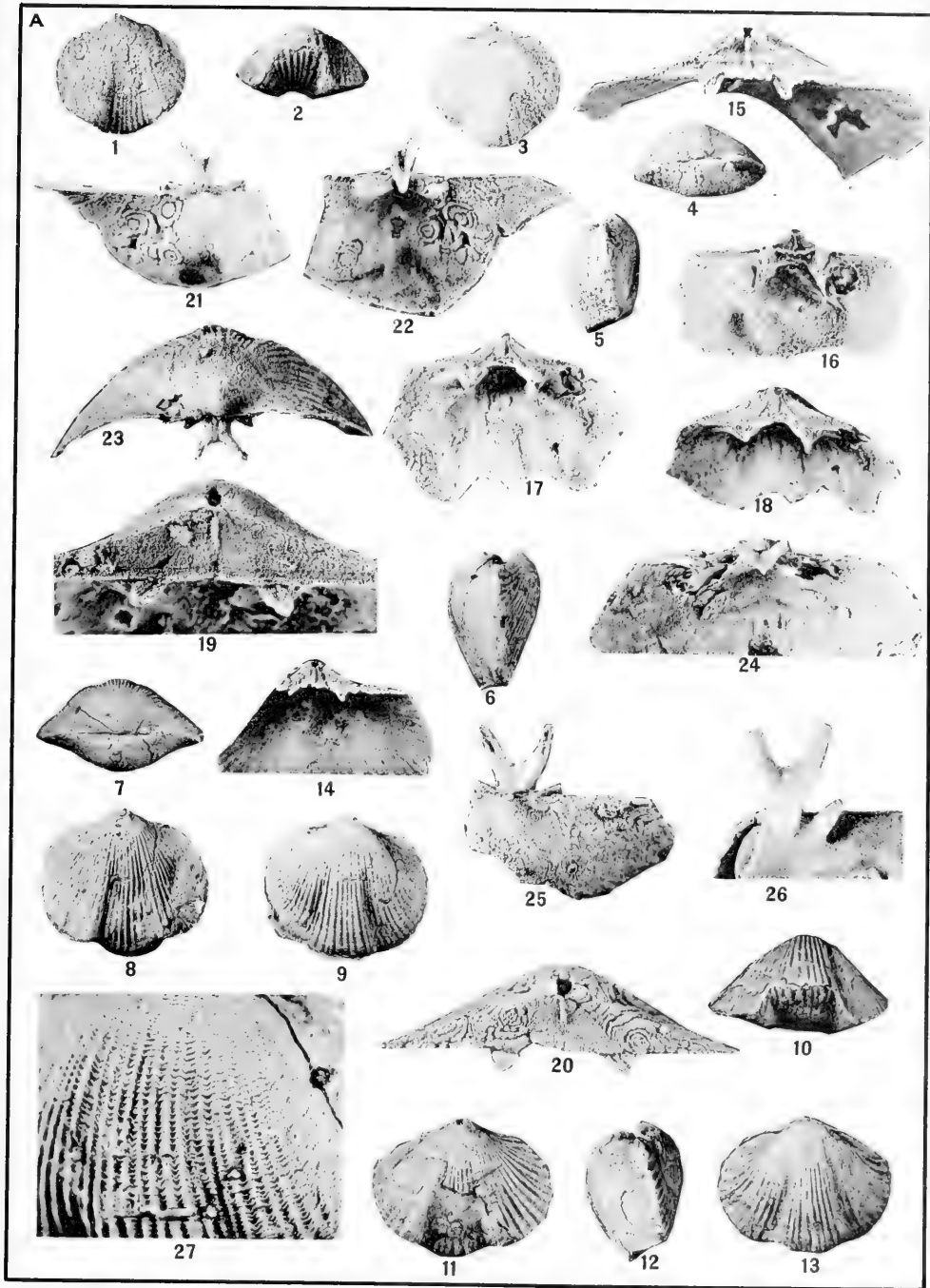
OXOPLECTIA

(SEE EXPLANATION OF PLATES.)



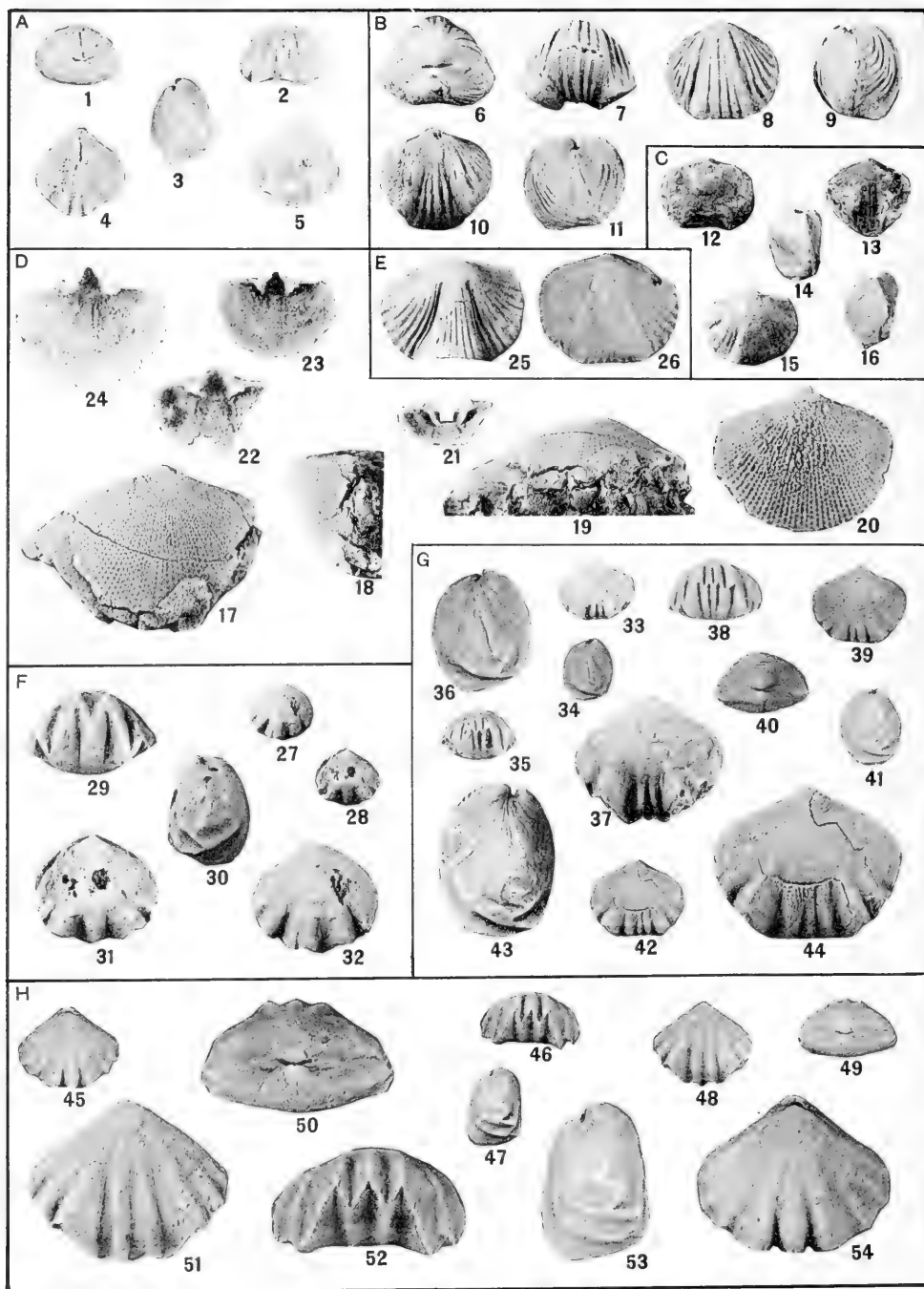
OXOPLECIA

(SEE EXPLANATION OF PLATES.)



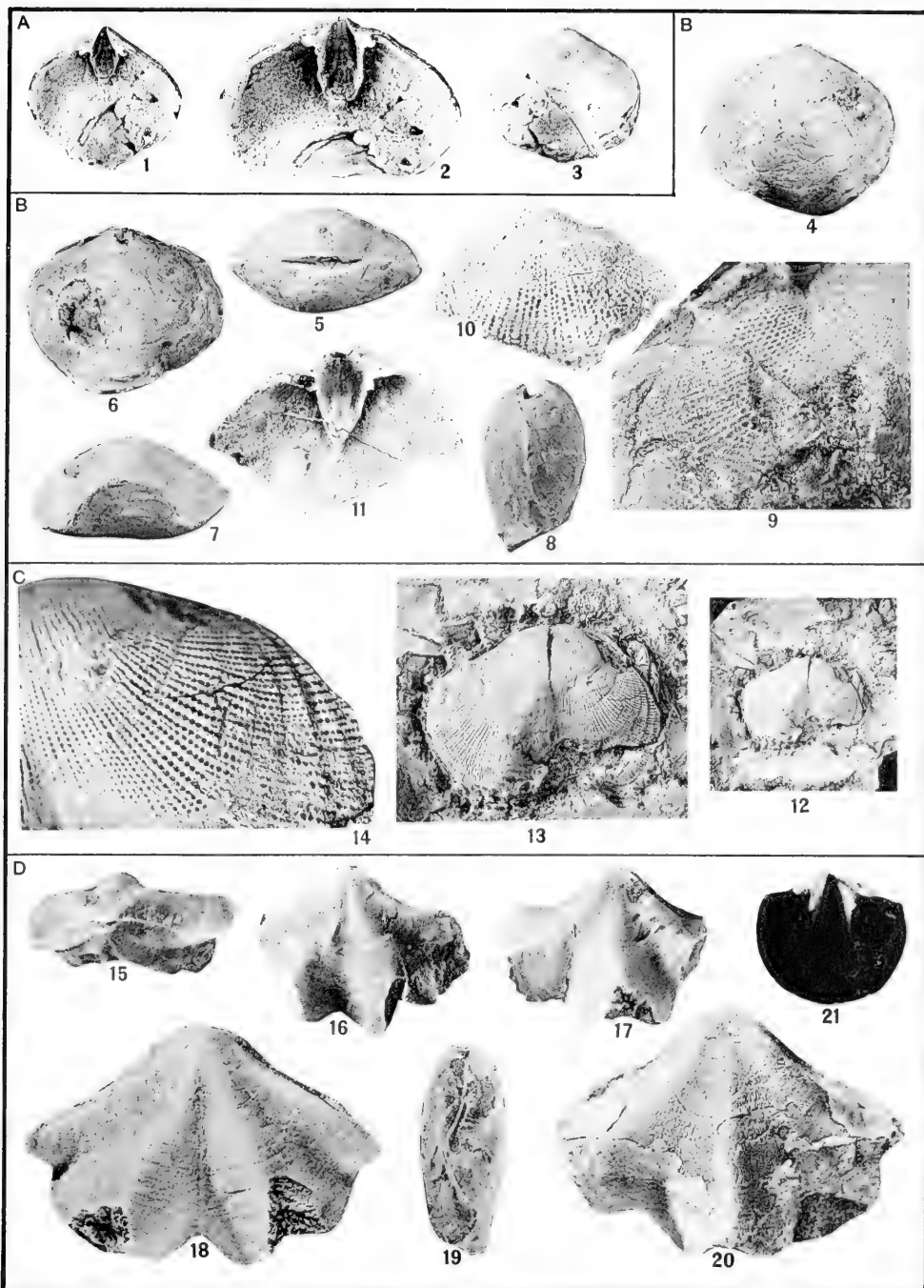
OXOPLECIA

(SEE EXPLANATION OF PLATES.)

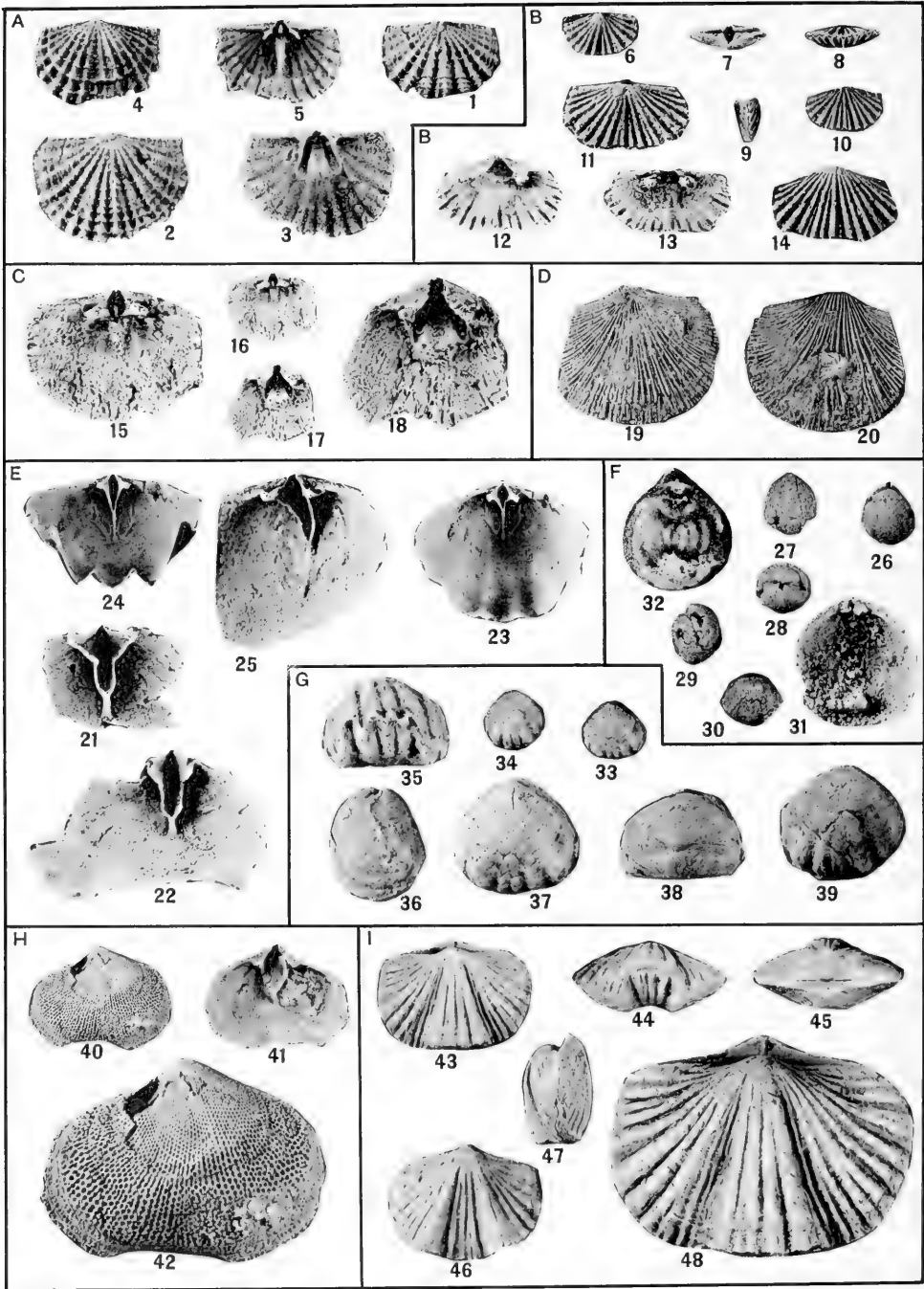


CAMERELLA, OXOPLECIA, PARASTROPHINA, PORAMBONITES

(SEE EXPLANATION OF PLATES.)



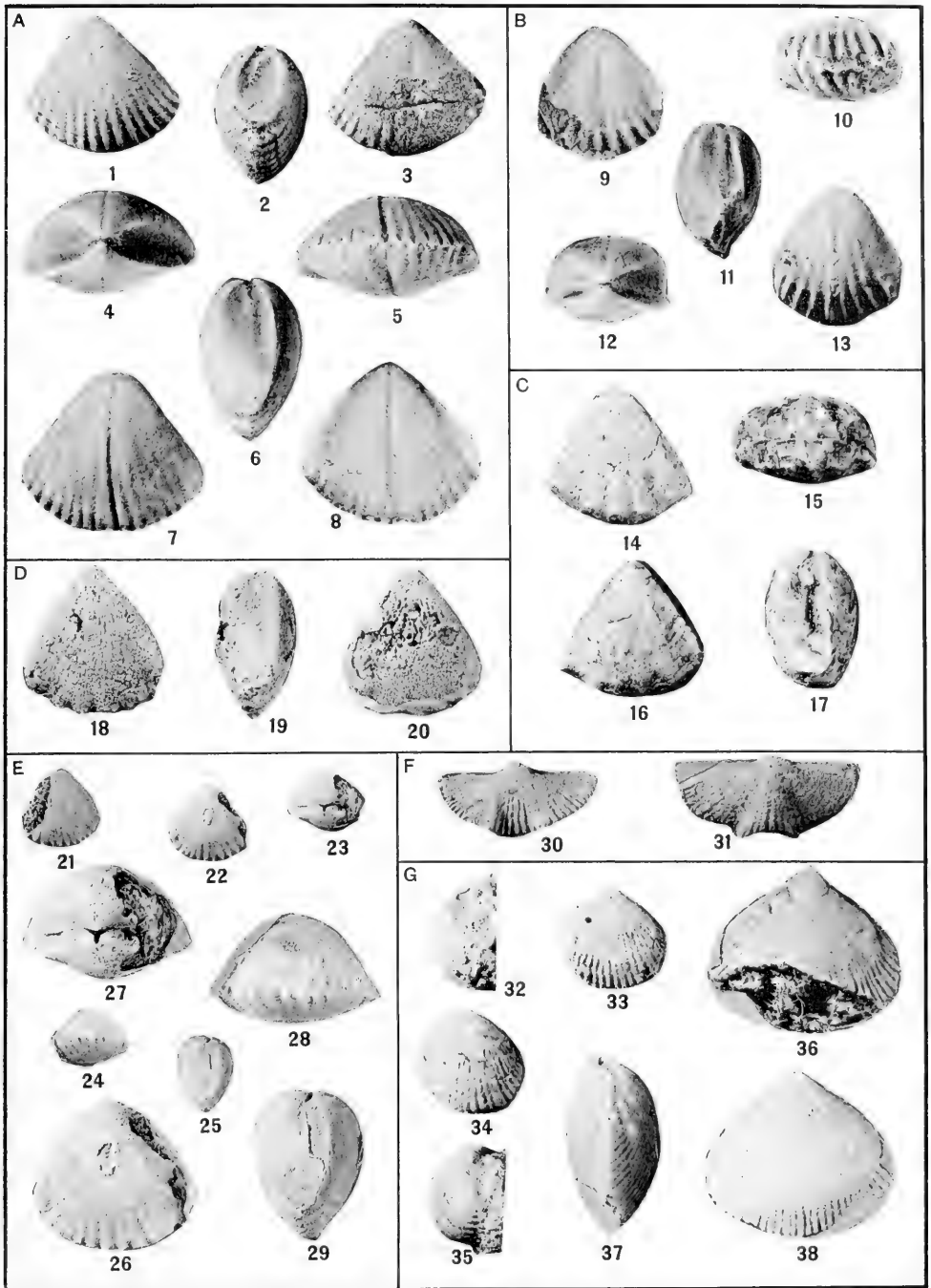
PORAMBONITES, SALONIA  
(SEE EXPLANATION OF PLATES.)



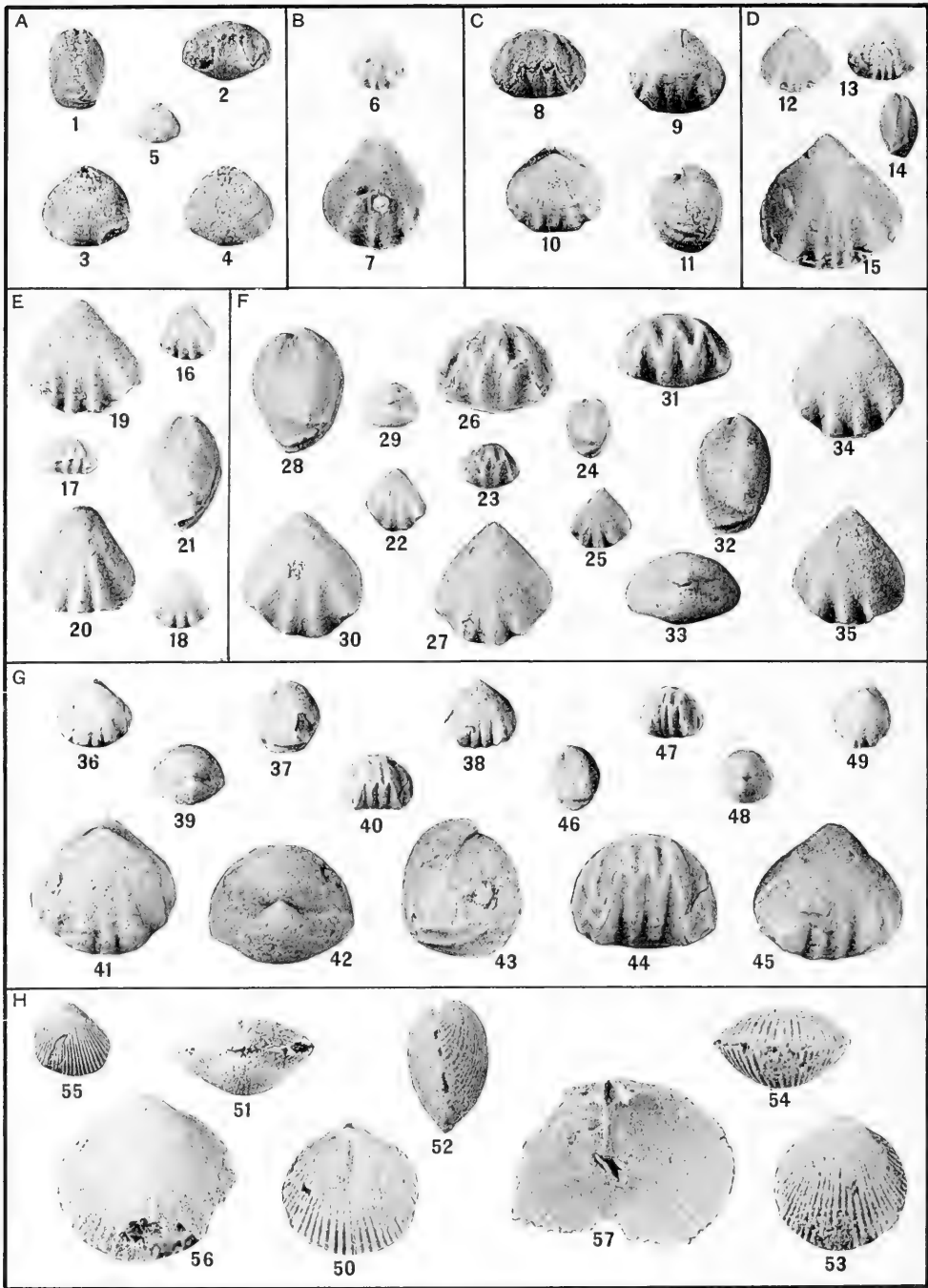
CAMERELLA, GLYPTORTHIS, IDIOSPIRA, OXOPLECIA, PERIMECOCOELIA,  
PORAMBONITES, TAPHRORTHIS

(SEE EXPLANATION OF PLATES.)

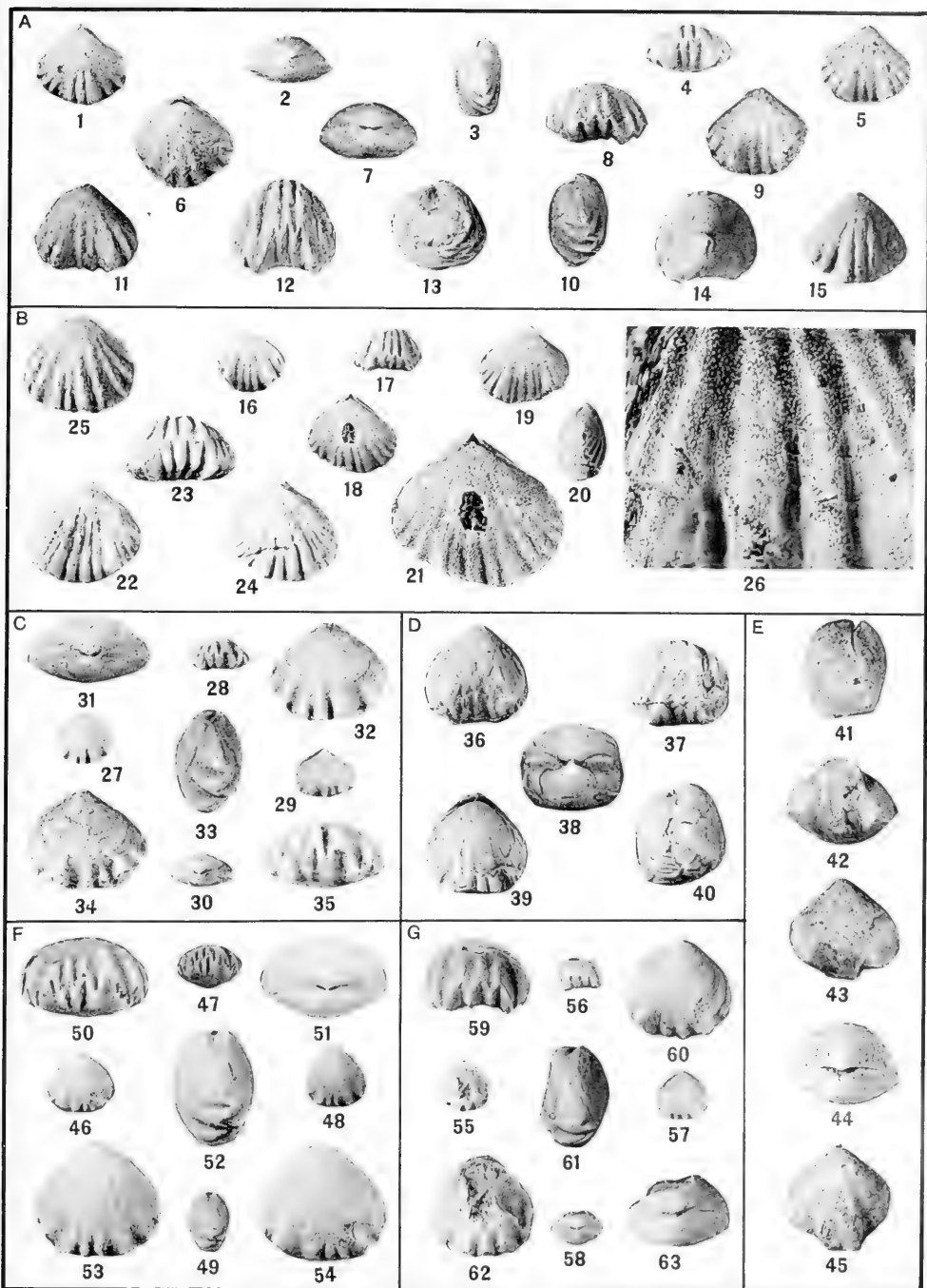




CAMERELLA, IDIOSTROPHIA, RHYSTROPHIA  
(SEE EXPLANATION OF PLATES.)

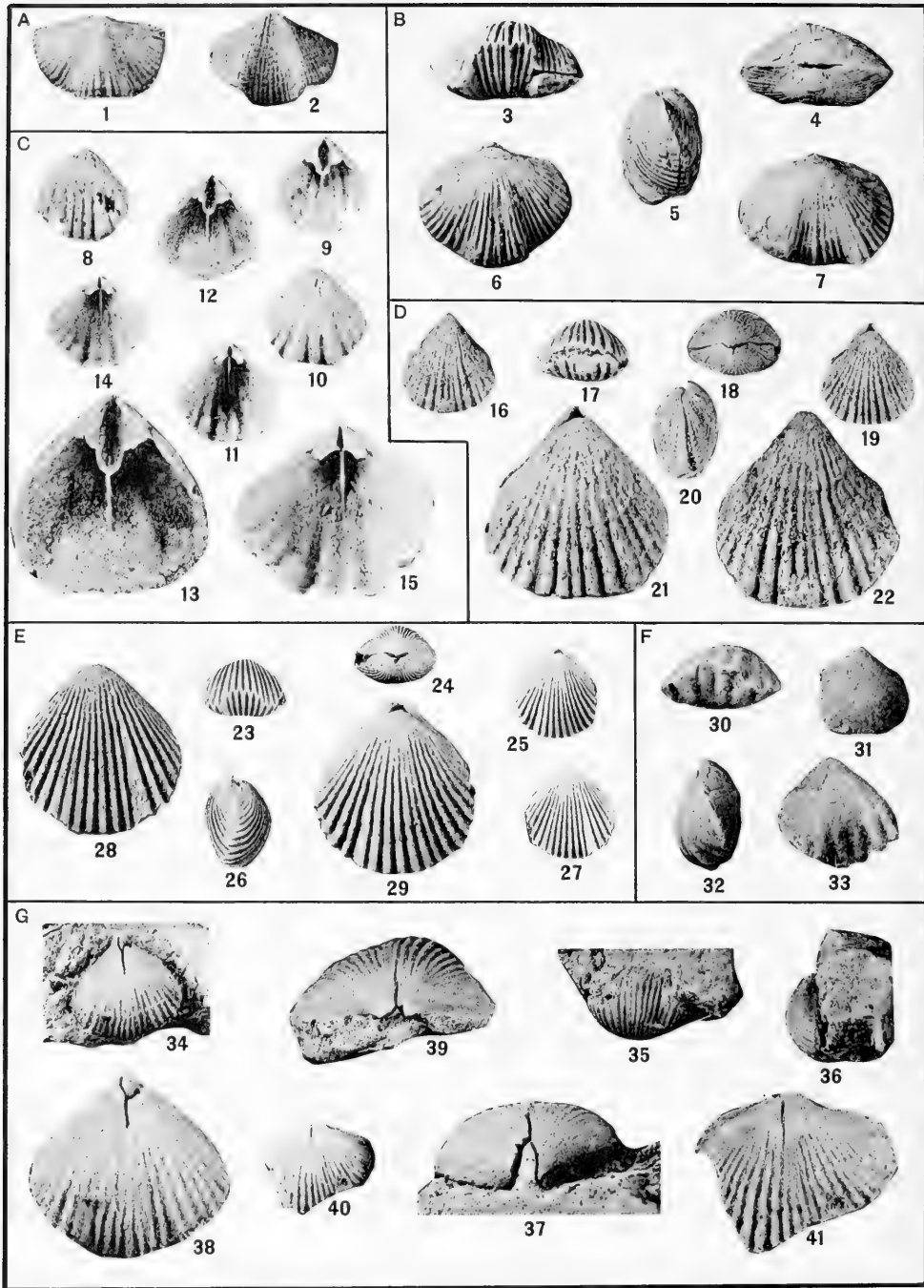


CAMERELLA, LIRICAMERA  
(SEE EXPLANATION OF PLATES.)

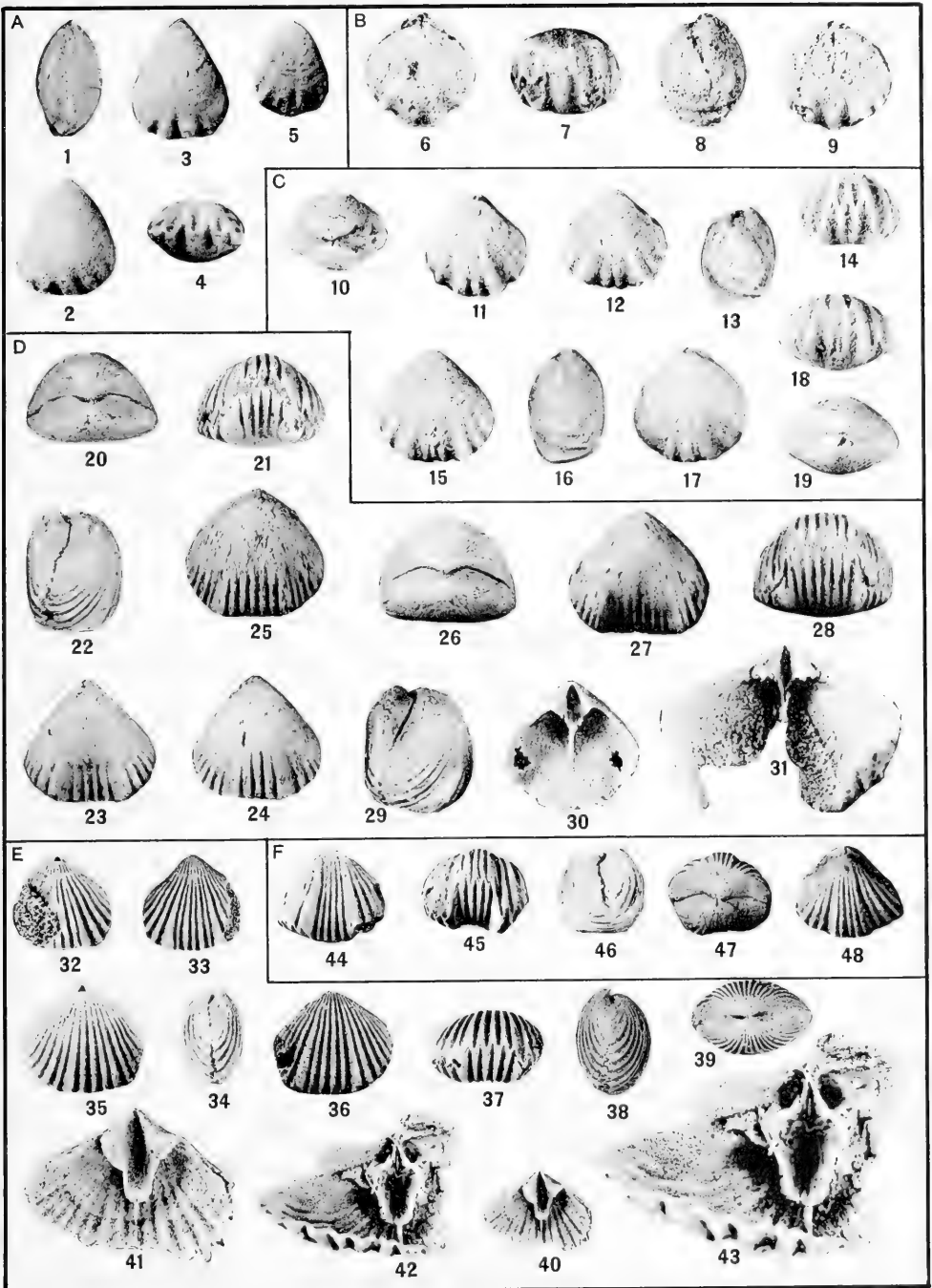


CAMERELLA, PERIMECOCOELIA, STENOCAMARA

(SEE EXPLANATION OF PLATES.)

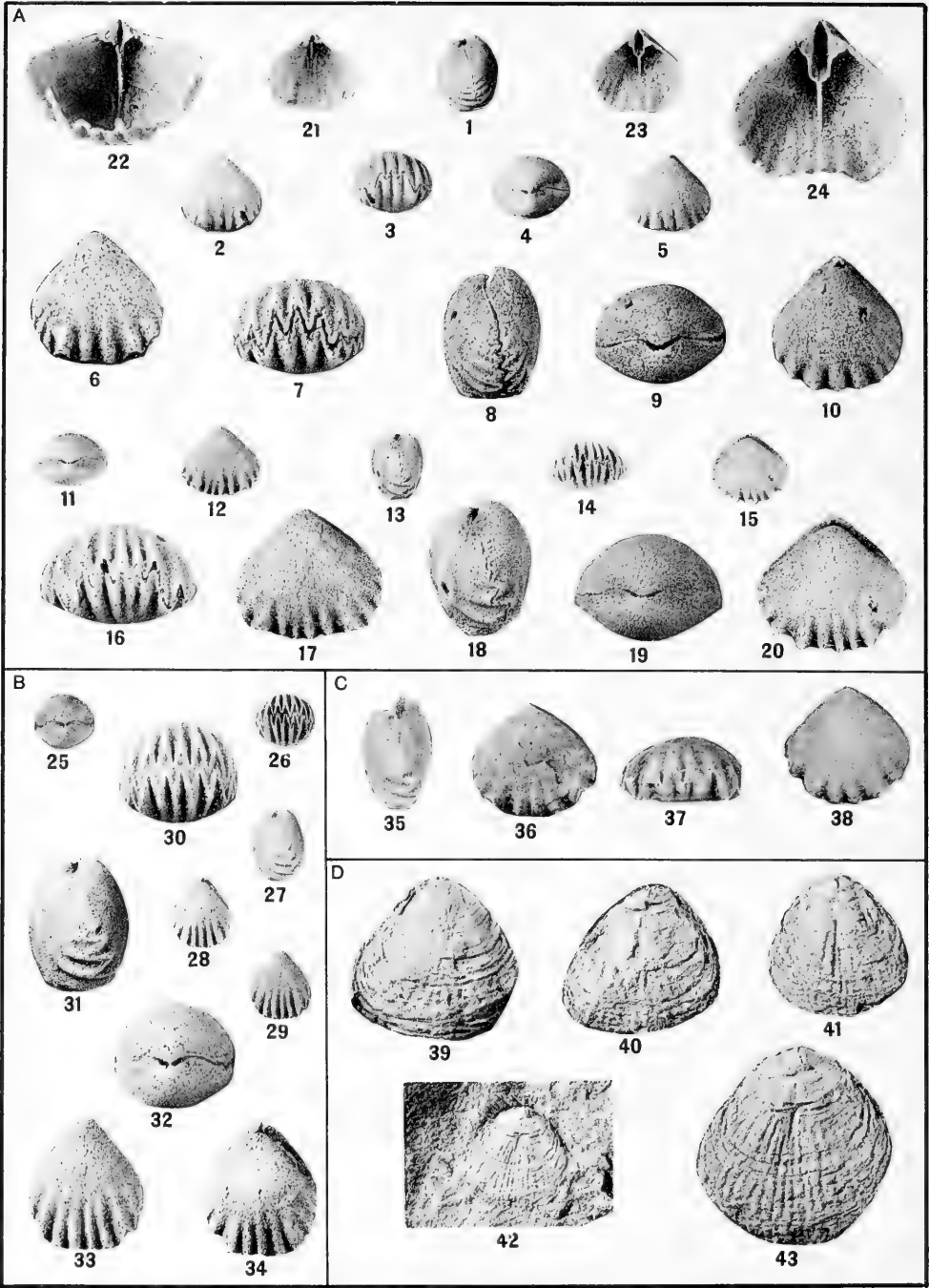


CAMERELLA, RHYSTOSTROPHIA  
(SEE EXPLANATION OF PLATES.)

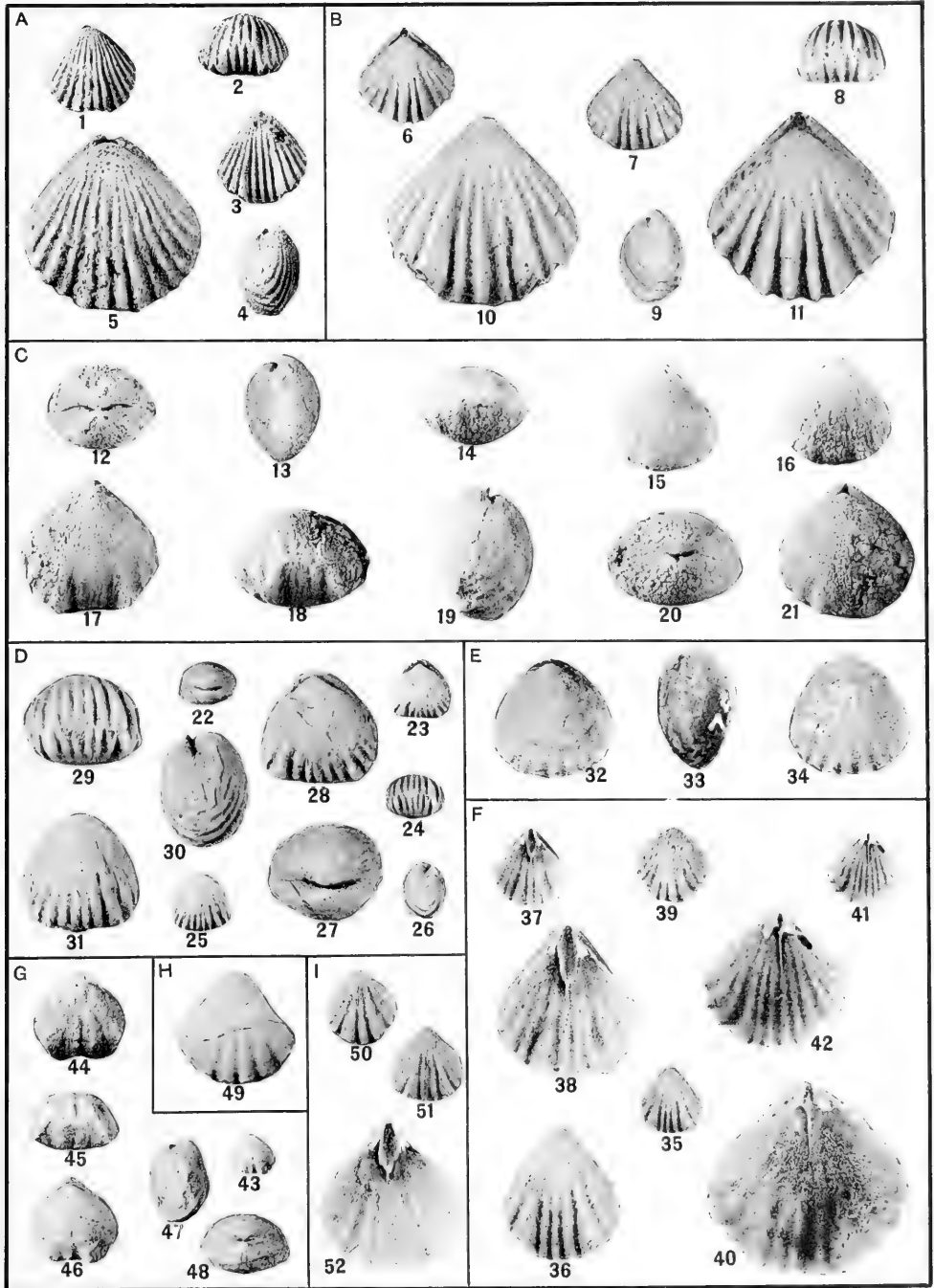


CAMERELLA, IDIOSTROPHIA

(SEE EXPLANATION OF PLATES.)

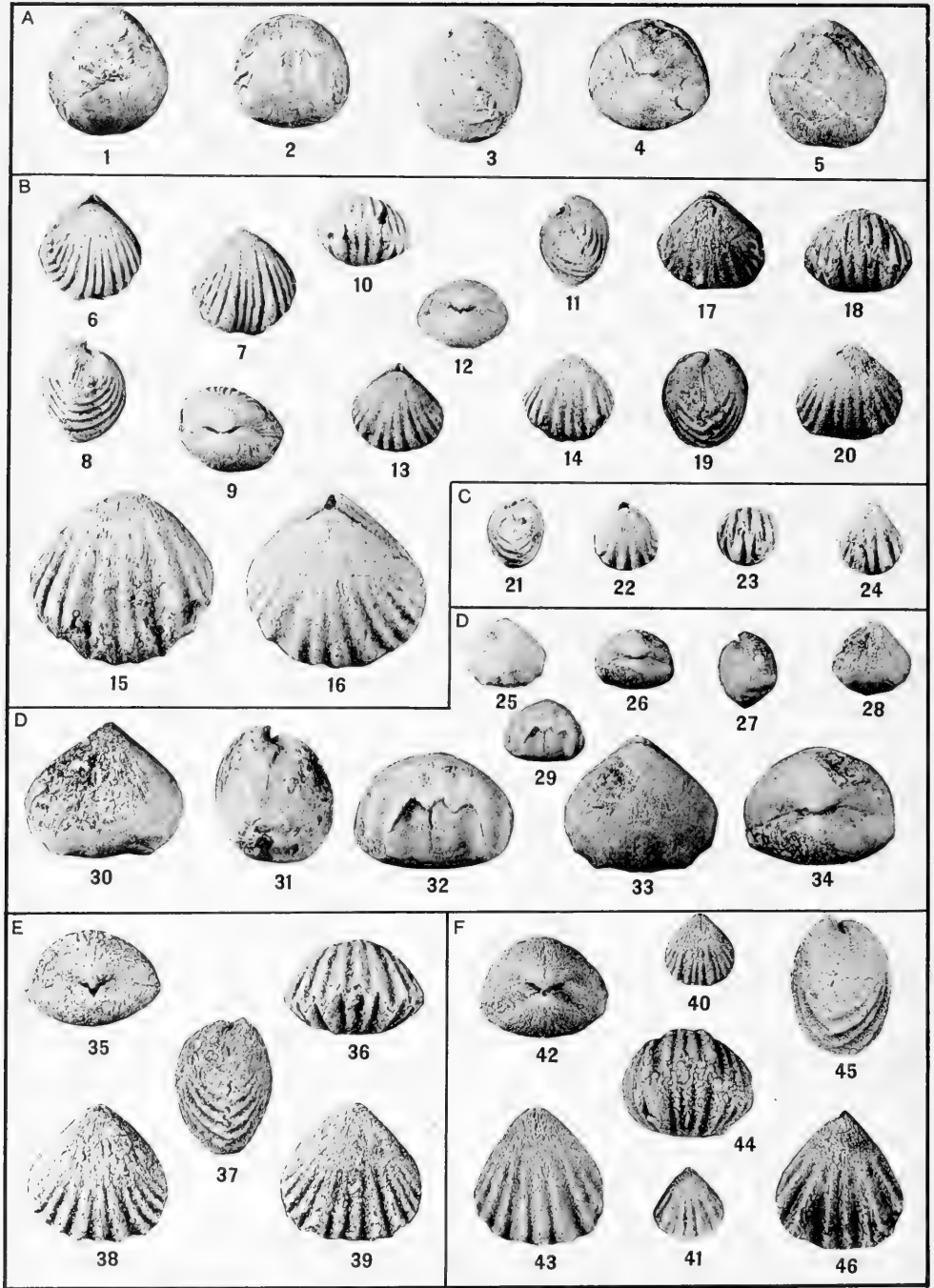


CAMERELLA, PERIMECOCOELIA  
(SEE EXPLANATION OF PLATES.)



CAMERELLA, PARALLELELASMA, STENOCAMARA

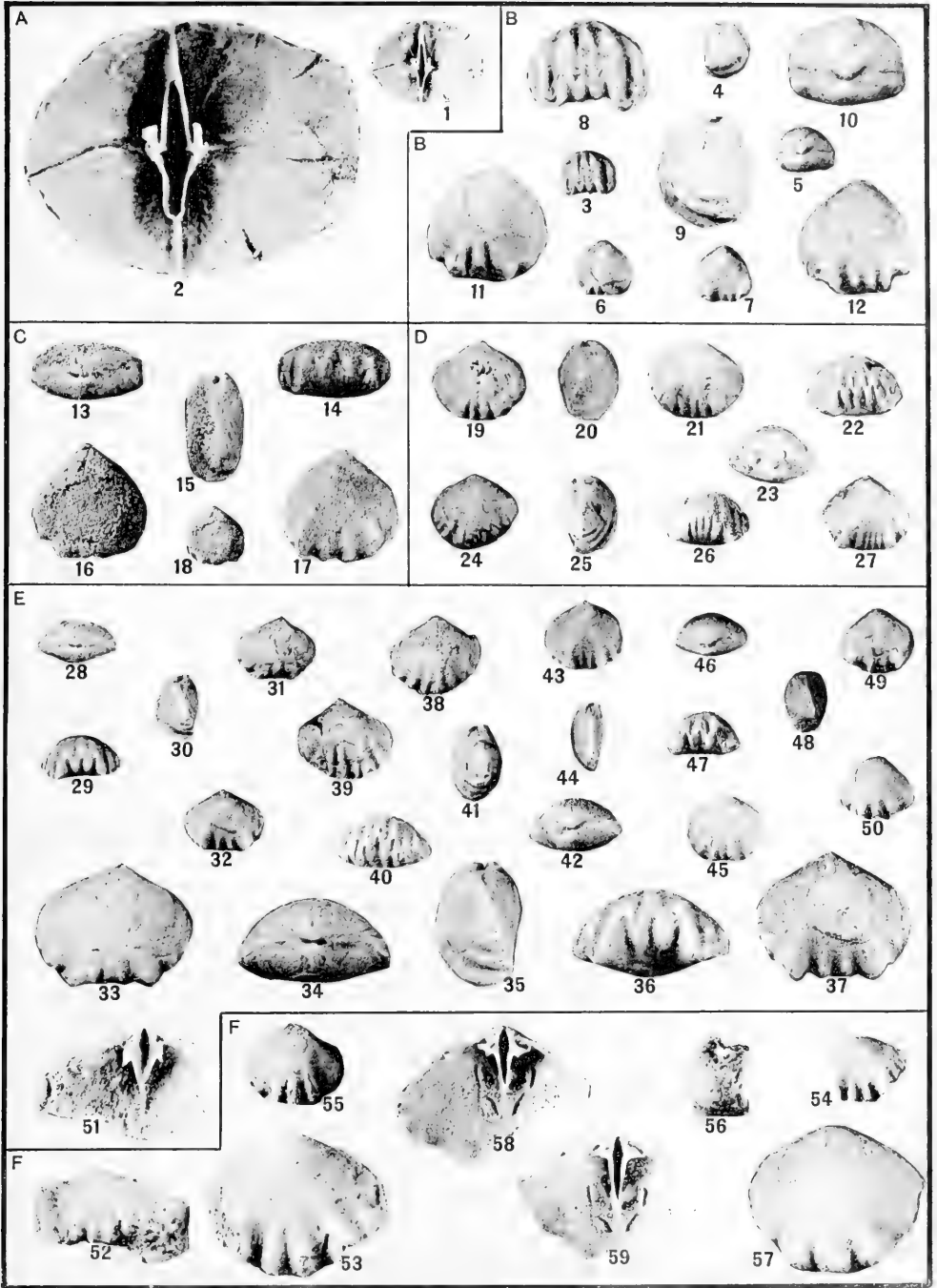
(SEE EXPLANATION OF PLATES.)



CAMERELLA

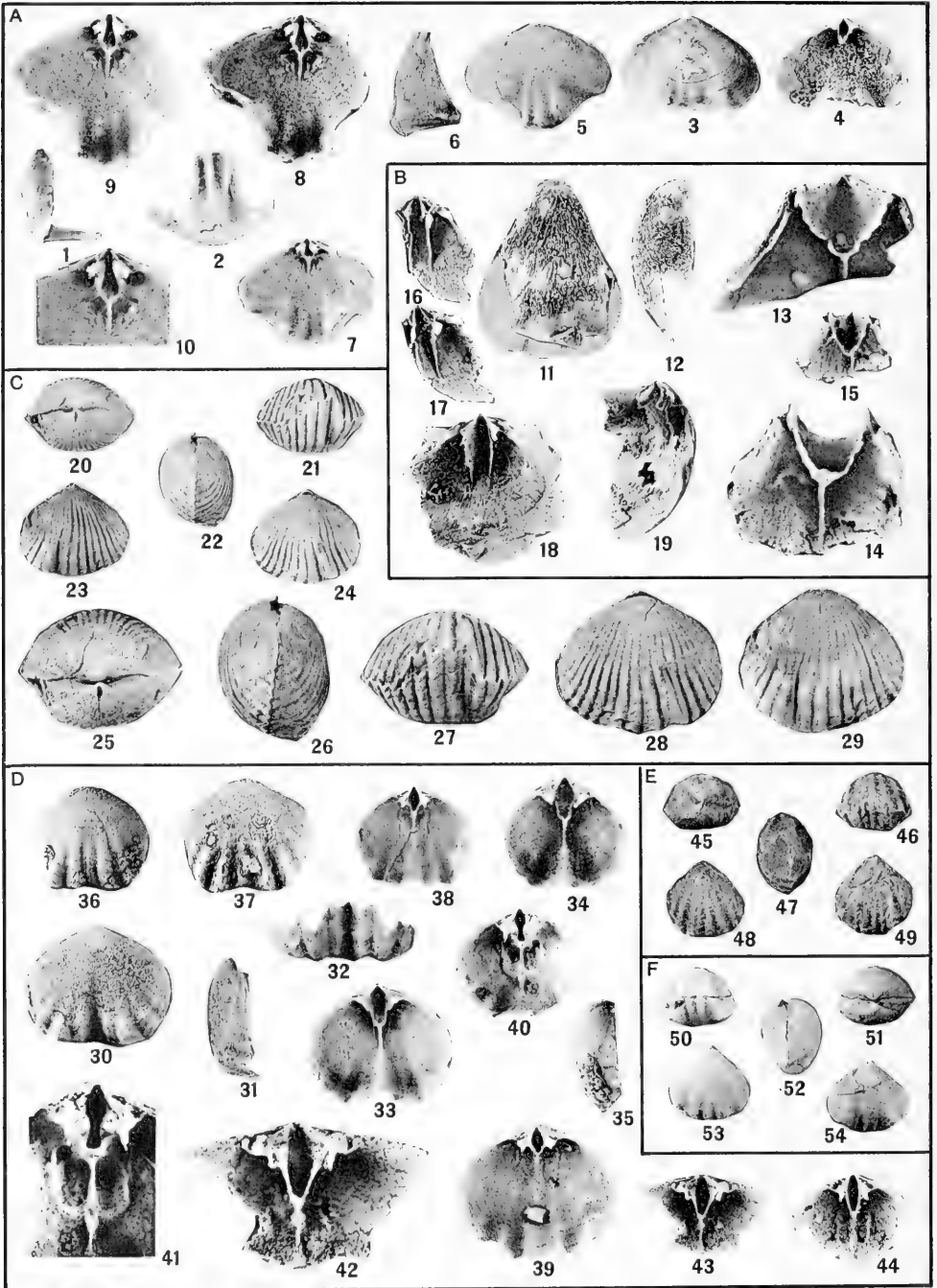
(SEE EXPLANATION OF PLATES.)



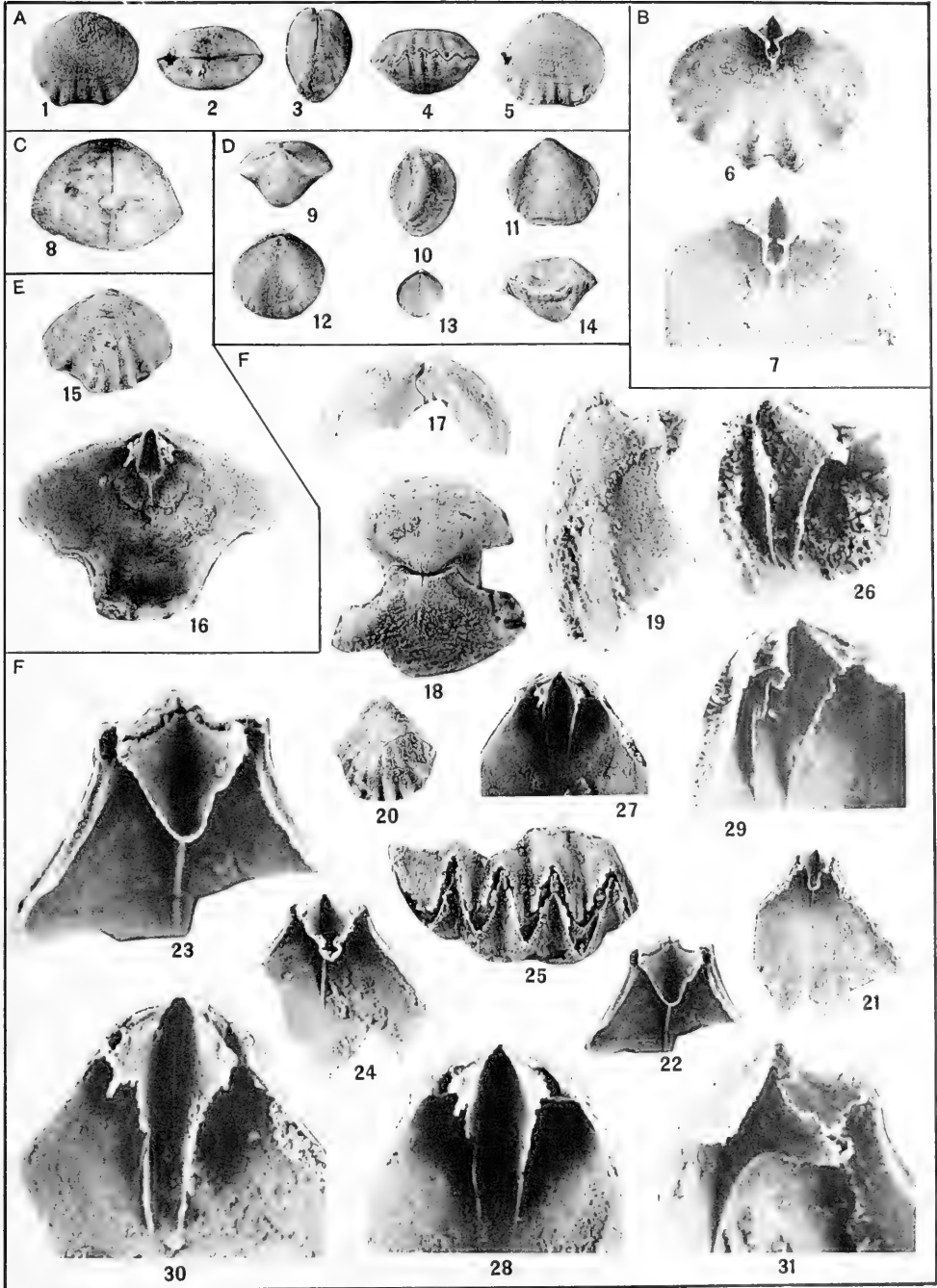


CAMERELLA, PARASTROPHINA, PERIMECOCOELIA

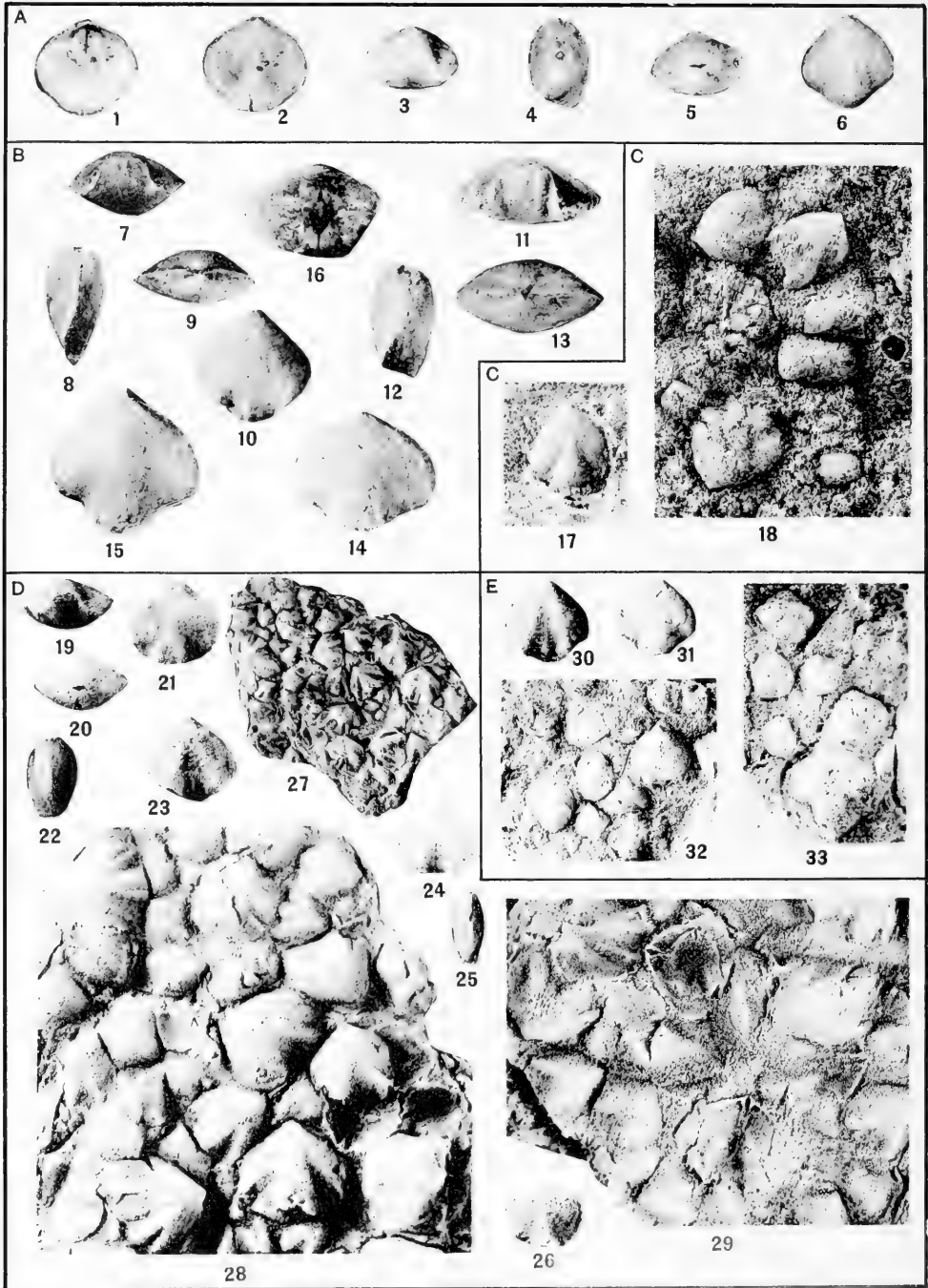
(SEE EXPLANATION OF PLATES.)



BREVICAMERA, CAMERELLA, PARALLELELASMA, PARASTROPHINA  
(SEE EXPLANATION OF PLATES.)

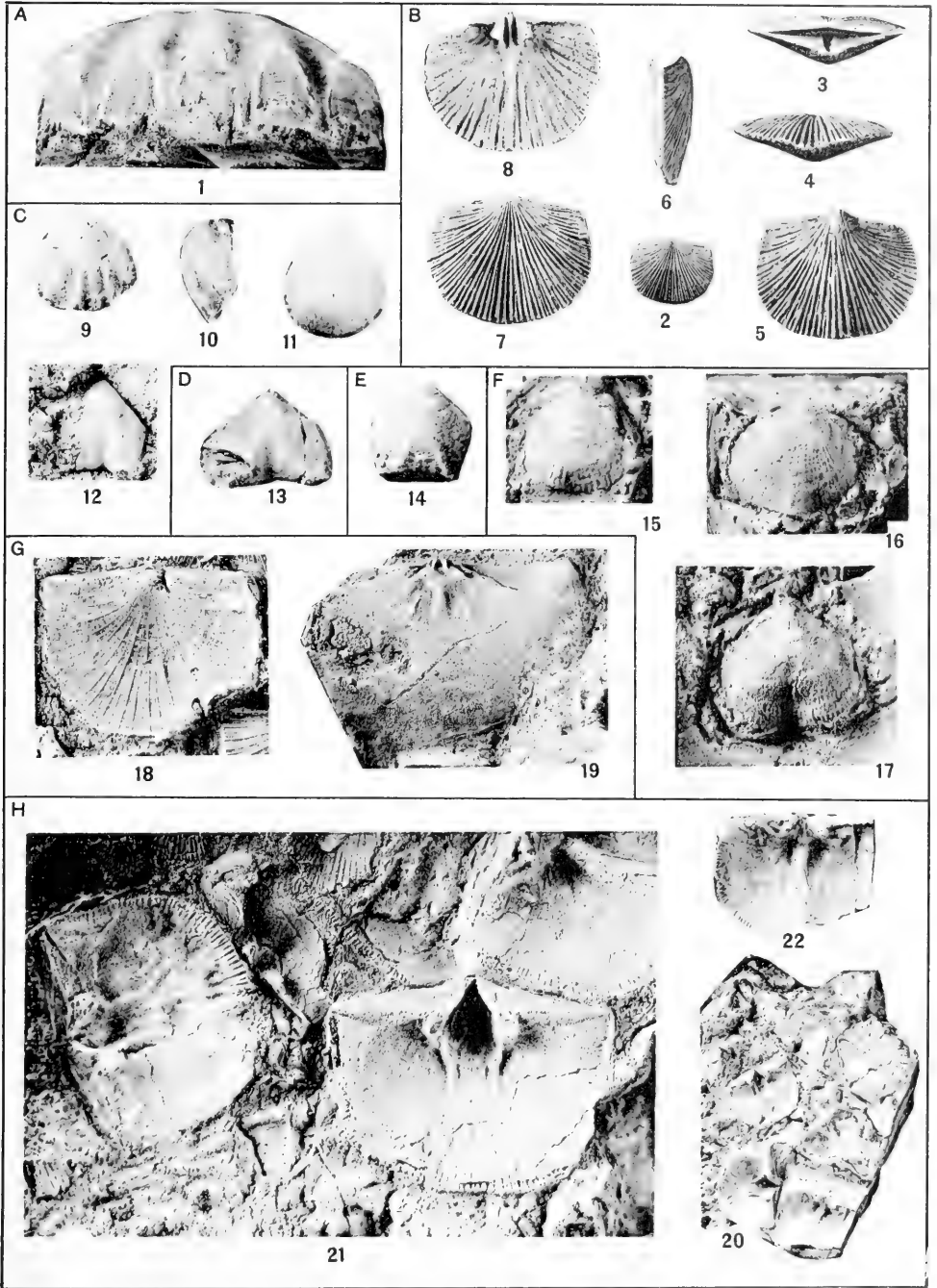


BREVICAMERA, PARALLELELASMA, PARASTROPHINA, PERIMECOCOELIA,  
PROTOZYGA, STENOCAMARA  
(SEE EXPLANATION OF PLATES.)



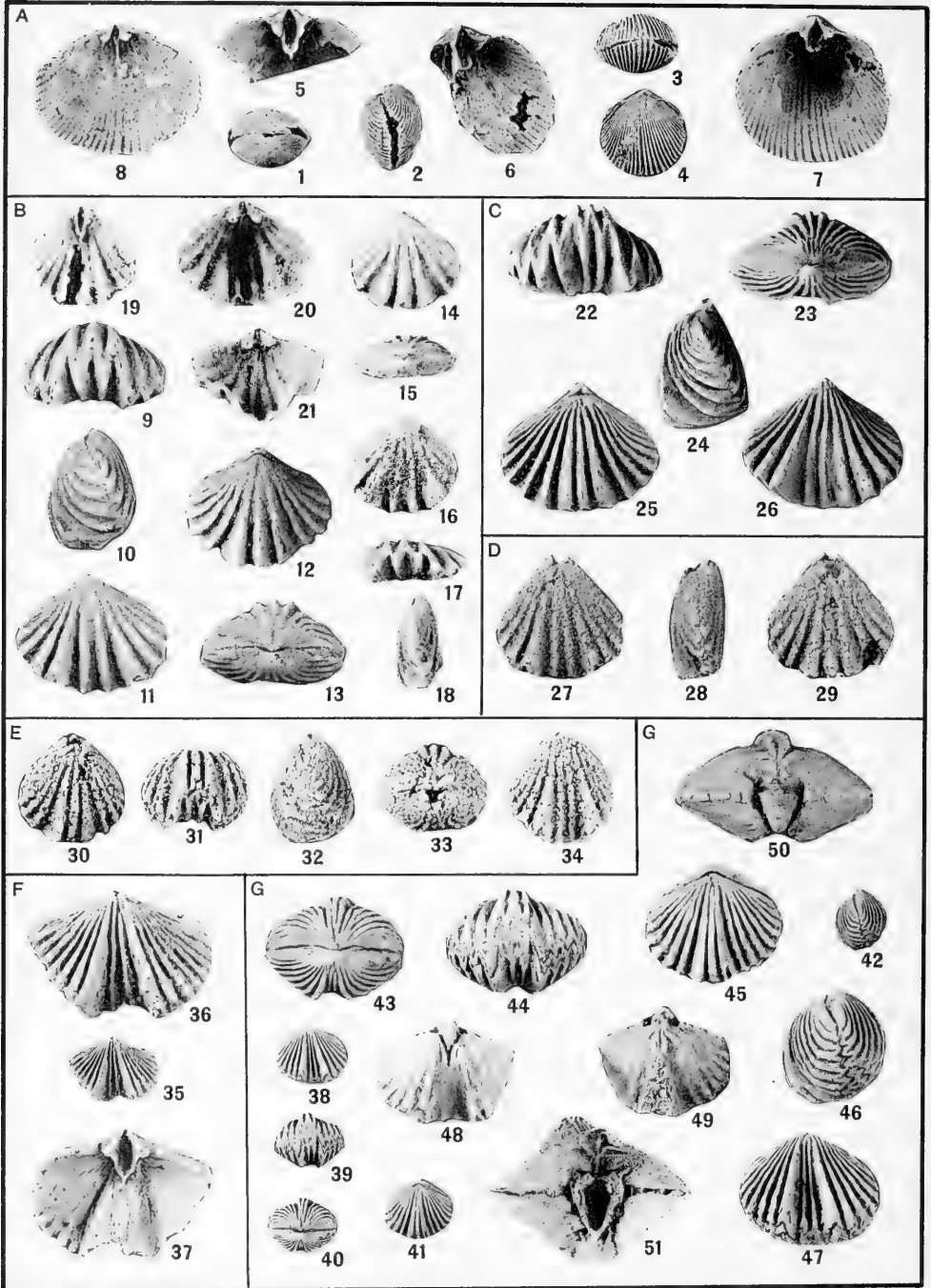
DIDYMELASMA, NEOSTROPHIA

(SEE EXPLANATION OF PLATES.)



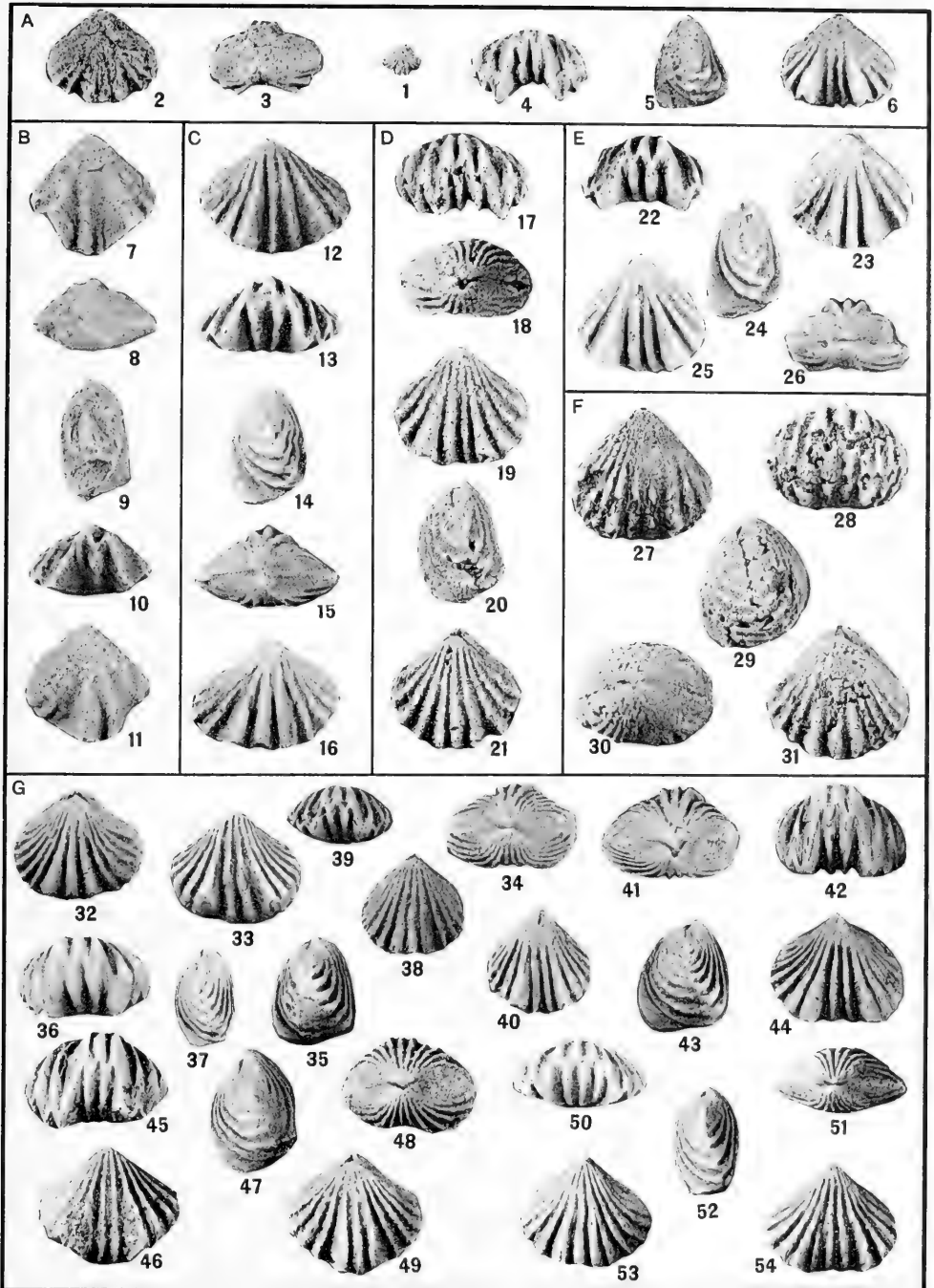
CAMERELLA, DALMANELLA, HESPERONOMIELLA, MACROCOELIA, ONYCHOPLECIA,  
PARALLELELASMA, TRIPLESIA

(SEE EXPLANATION OF PLATES.)

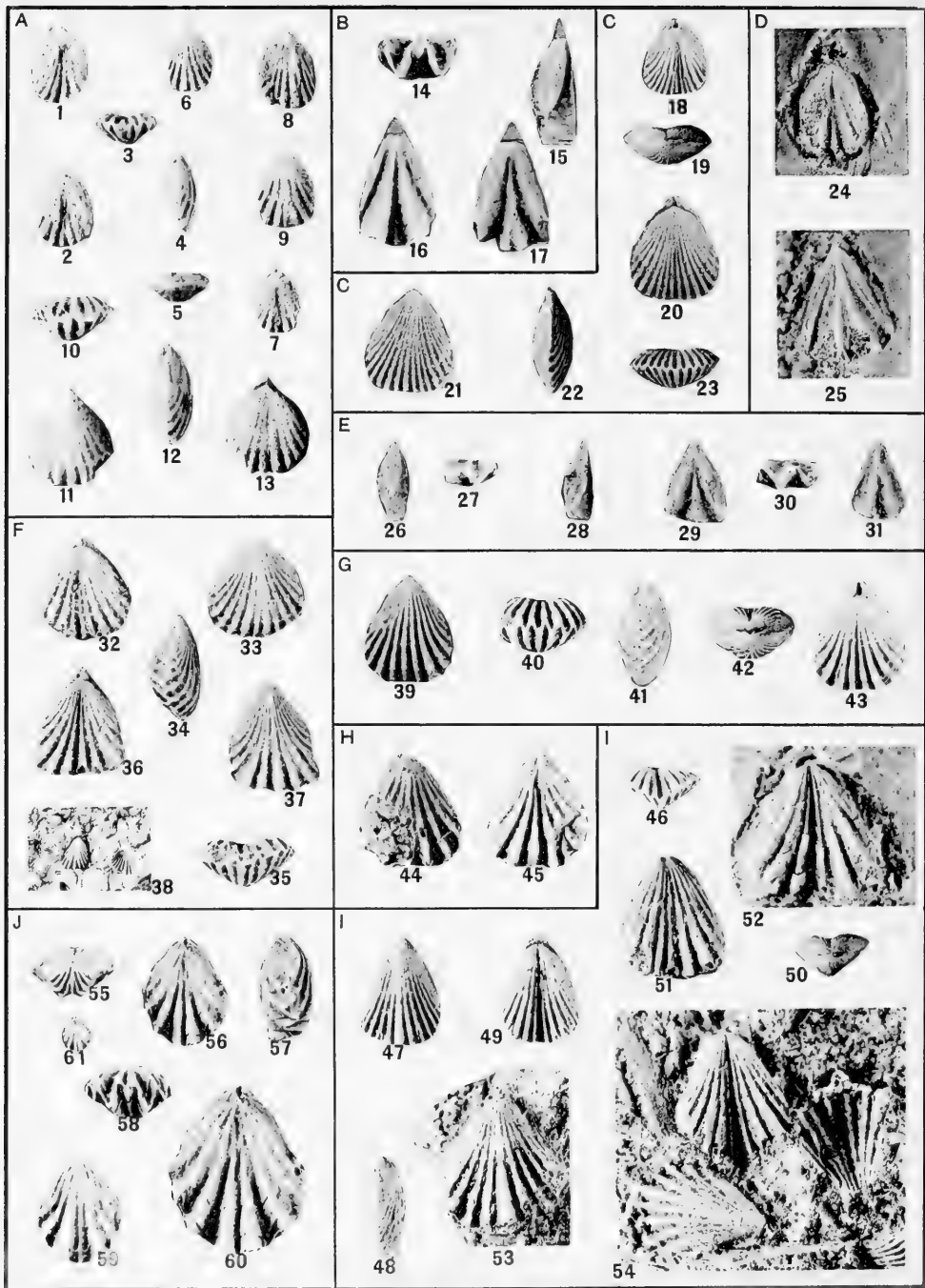


LIRICAMERA, PLECTOCAMARA

(SEE EXPLANATION OF PLATES.)



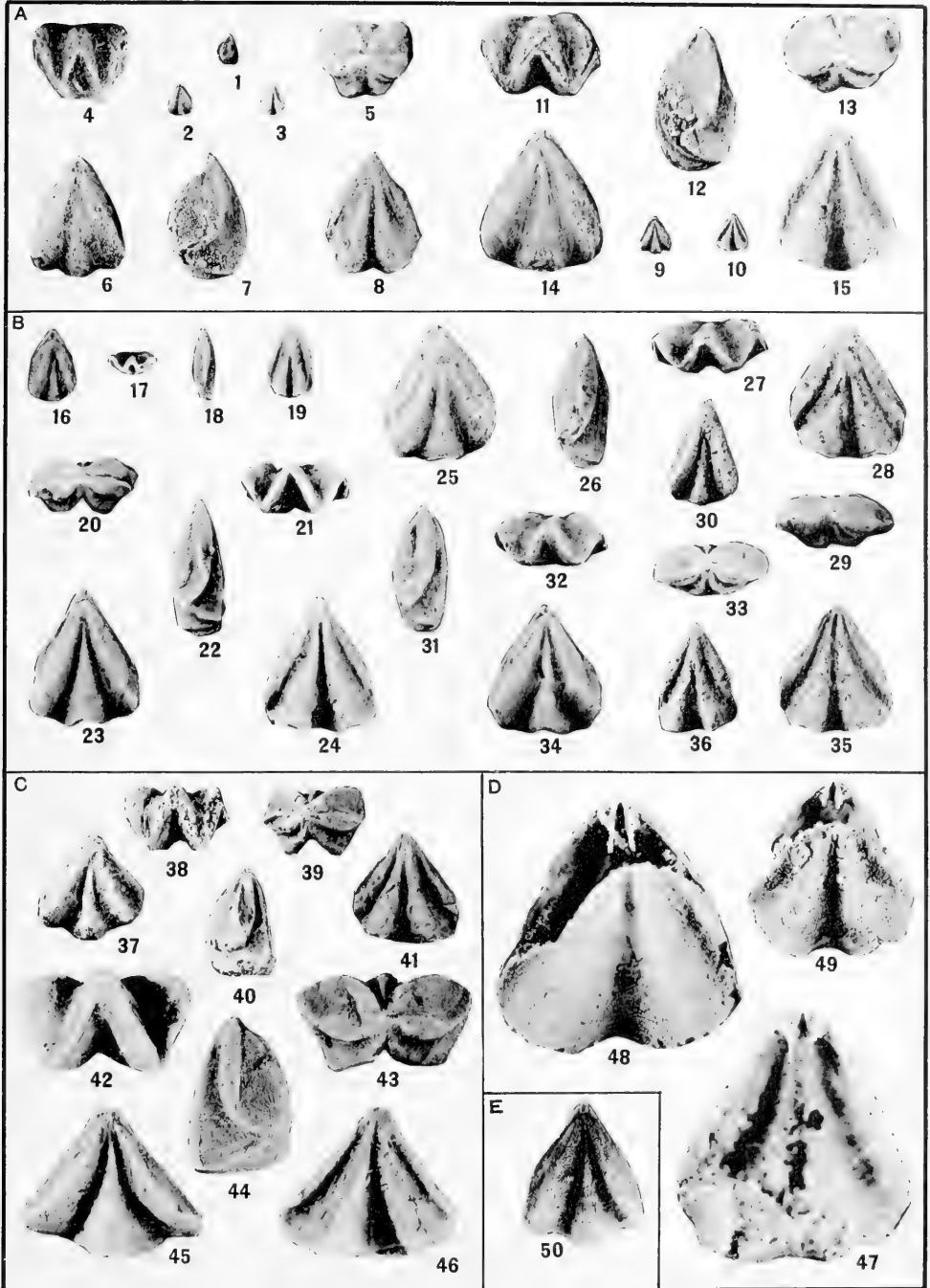
PLECTOCAMARA  
 (SEE EXPLANATION OF PLATES.)



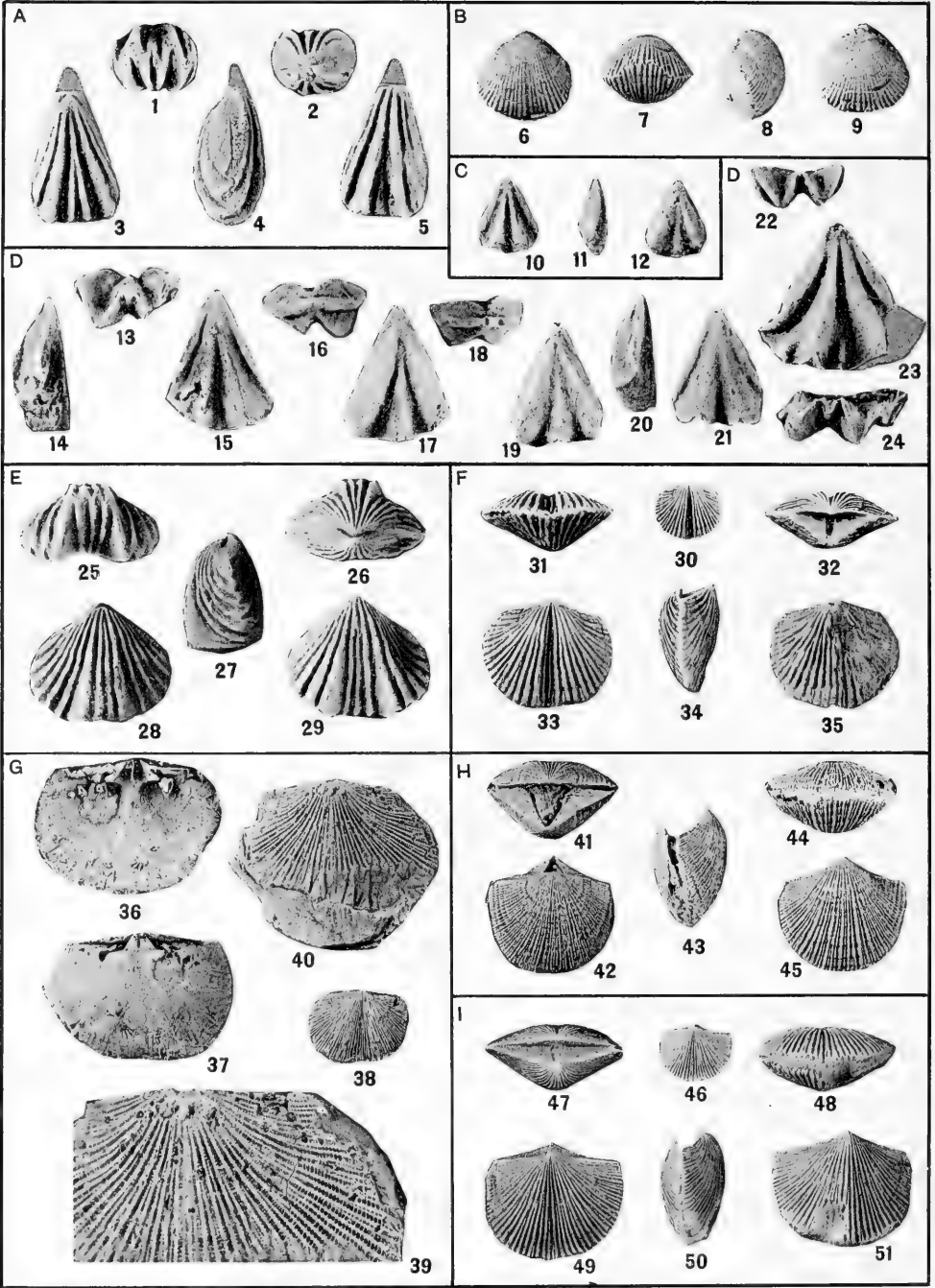
DORYTRETA, OLIGORHYNCHIA, ROSTRICELLULA, SPHENOTRETA

(SEE EXPLANATION OF PLATES.)



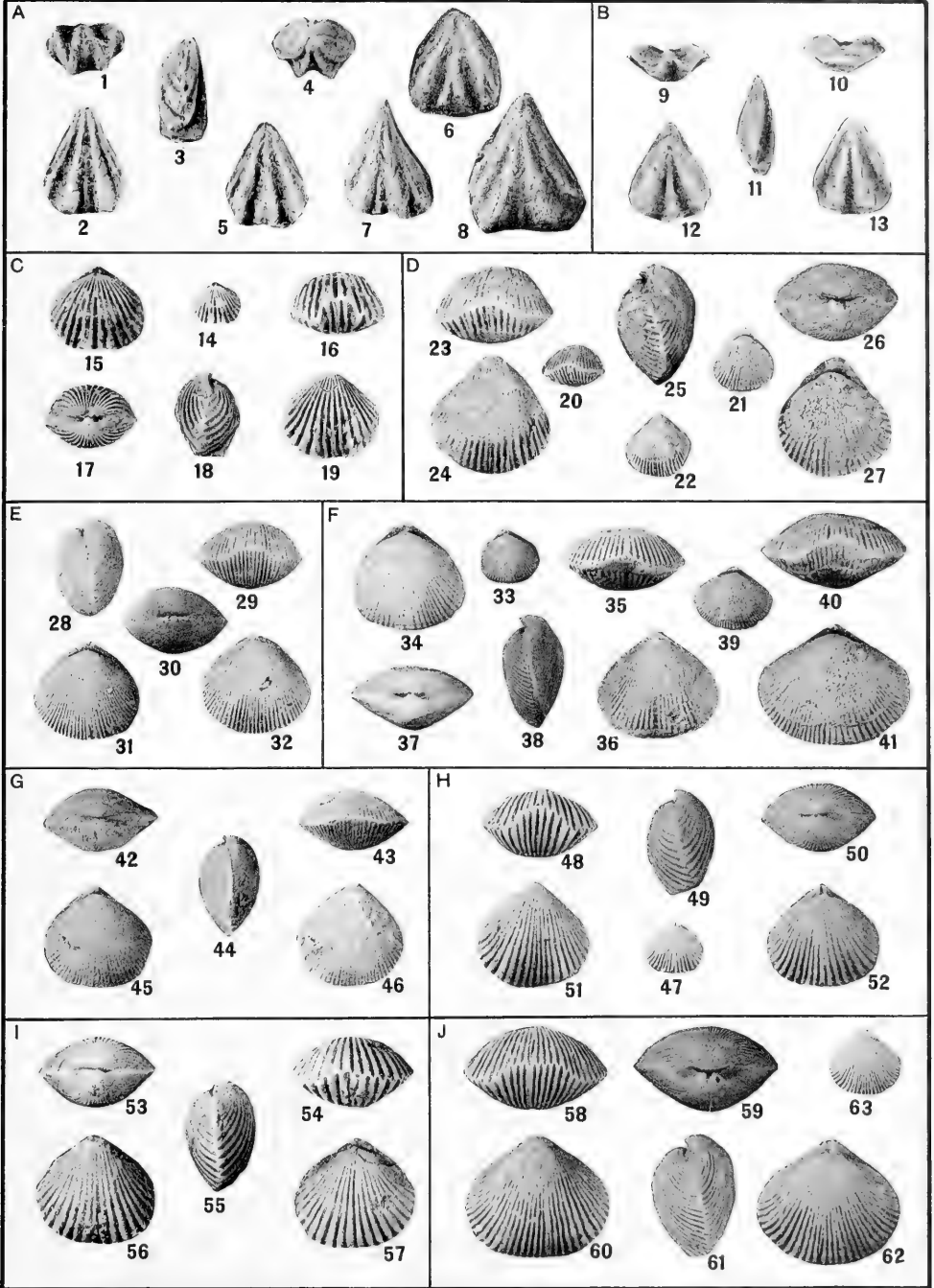


OLIGORHYNCHIA  
(SEE EXPLANATION OF PLATES.)



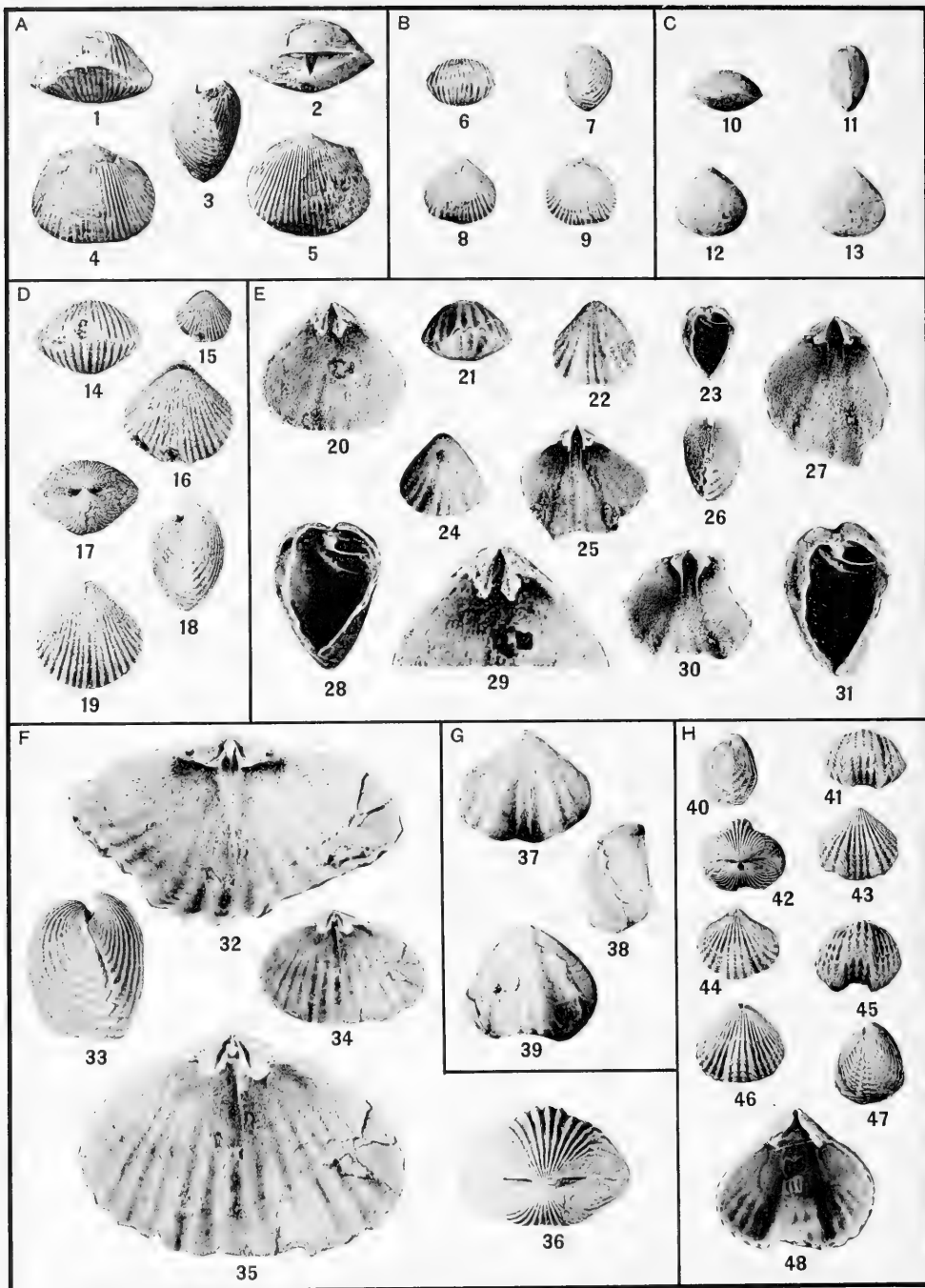
ANCISTRORHYNCHA, ATELELASMA, CHAULISTOMELLA, DALMANELLA,  
OLIGORHYNCHIA, PHRAGMORTHIS, PLECTOCAMARA

(SEE EXPLANATION OF PLATES.)



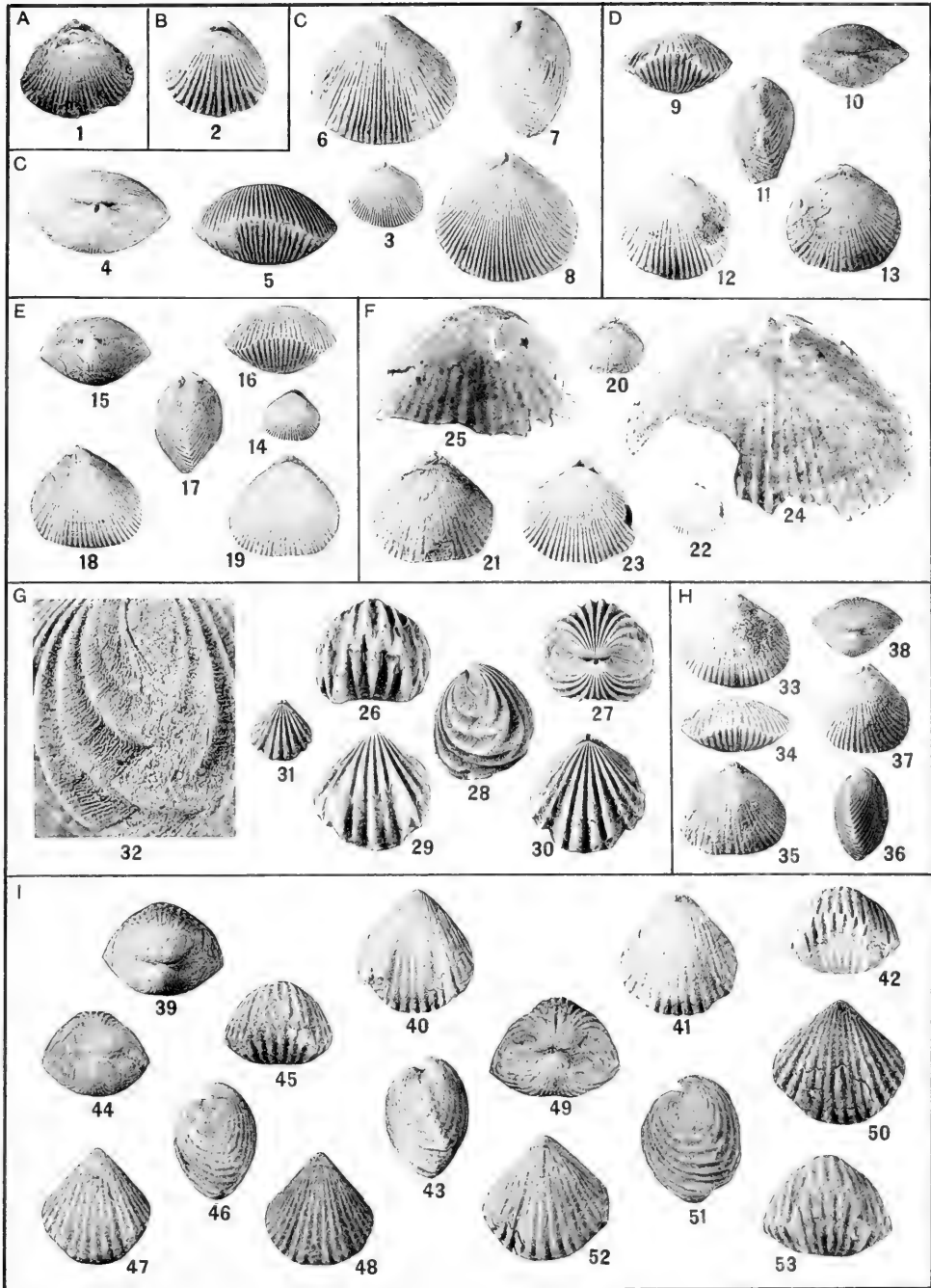
ANCISTRORHYNCHA, OLIGORHYNCHIA

(SEE EXPLANATION OF PLATES.)

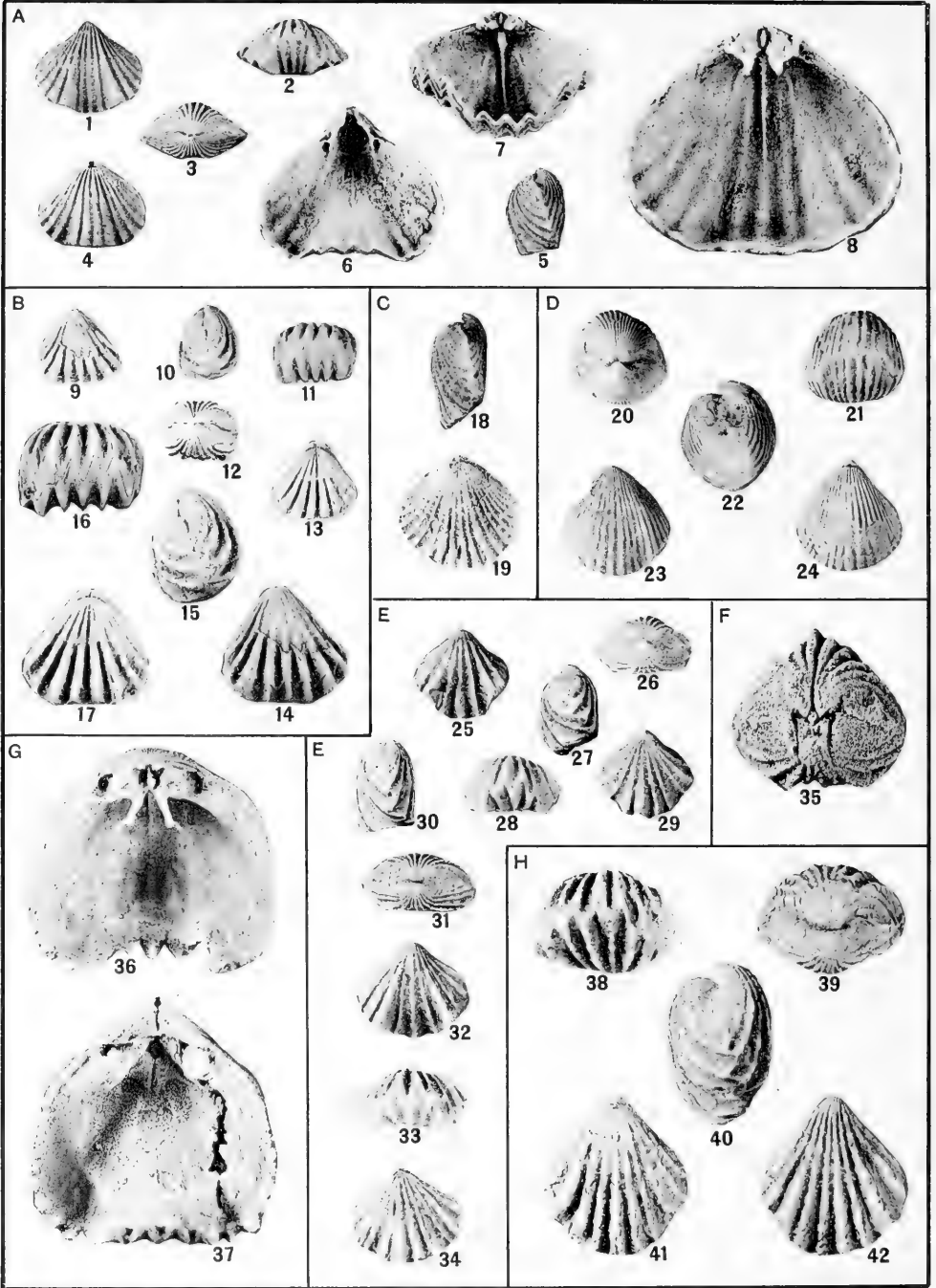


ANCISTORHYNCHA, DREPANORHYNCHA, MIMELLA, ORTHORHYNCHULA,  
 RHYNCHOTREMA

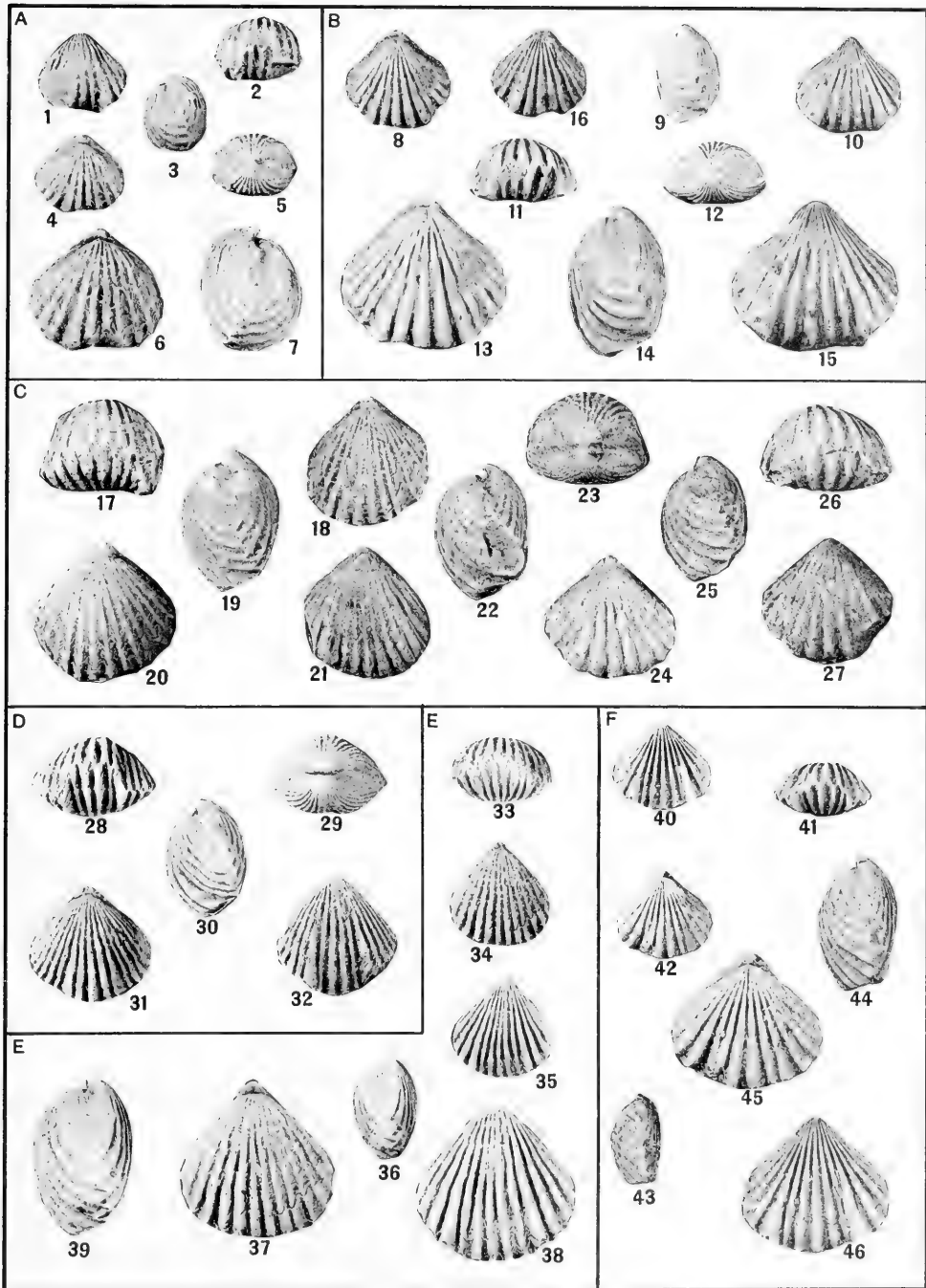
(SEE EXPLANATION OF PLATES.)



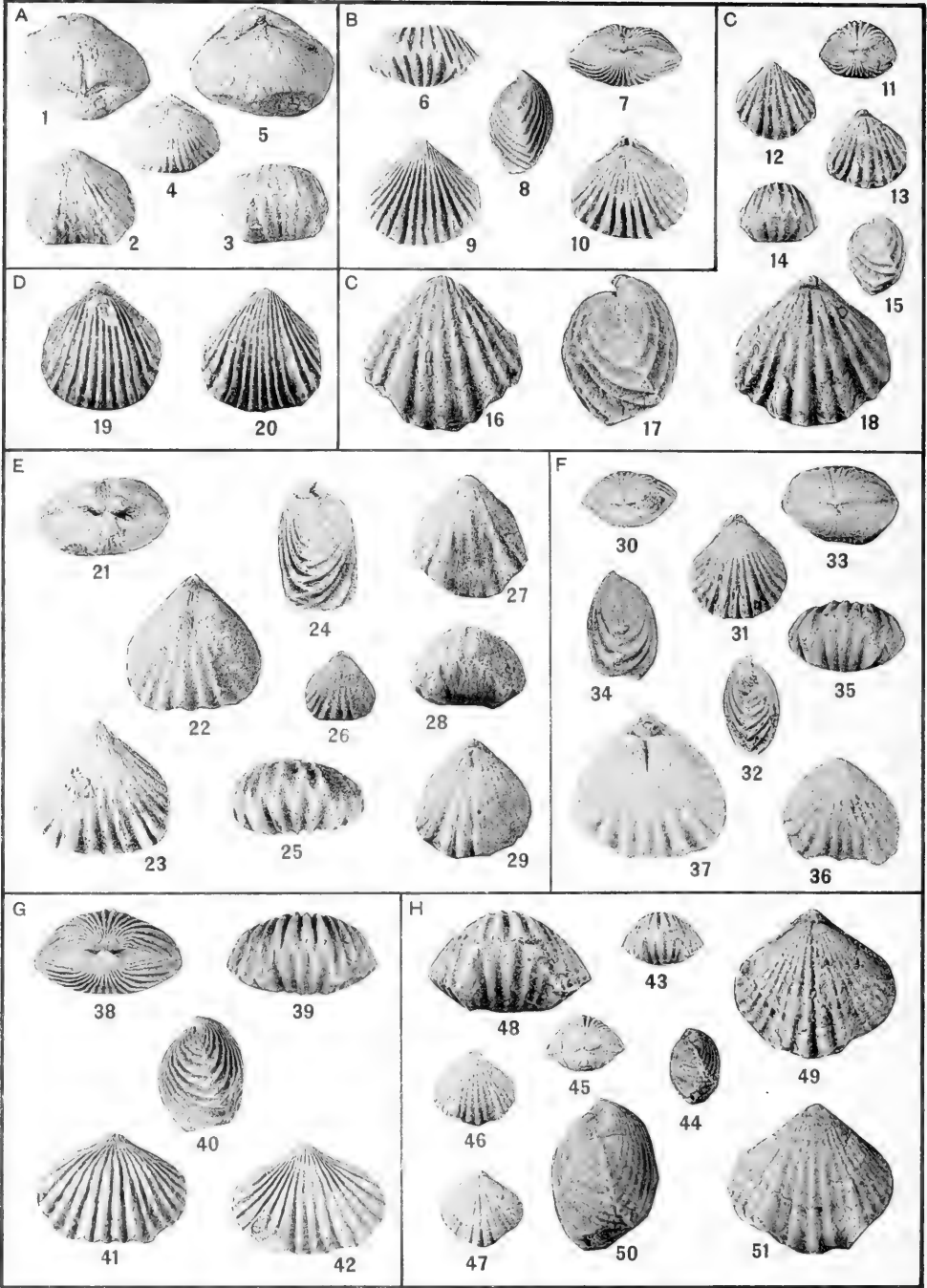
ANCISTRORHYNCHA, ROSTRICELLULA  
 (SEE EXPLANATION OF PLATES.)



LEPIDOCYCLUS, RHYNCHOTREMA, ROSTRICELLULA  
(SEE EXPLANATION OF PLATES.)



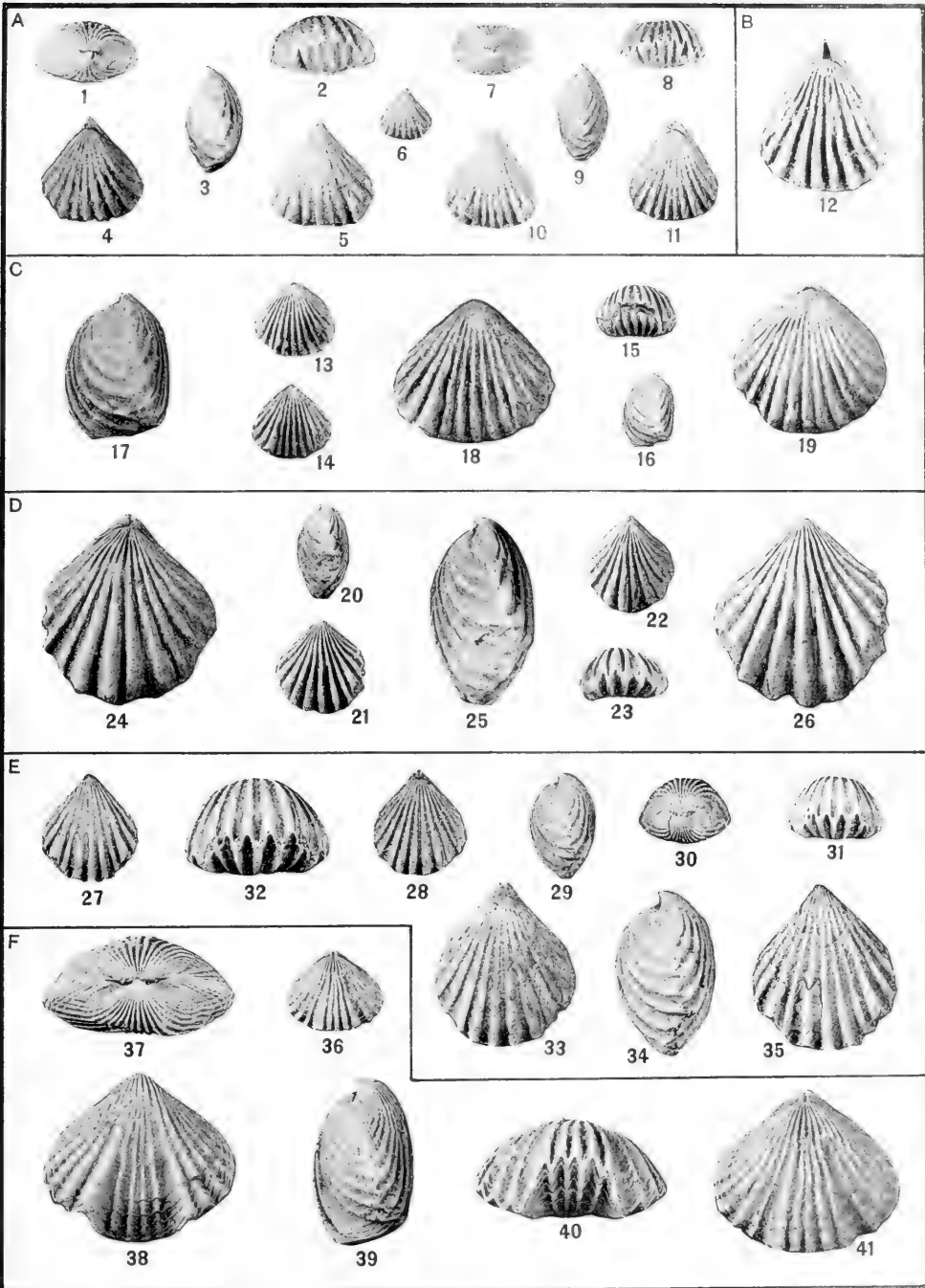
ROSTRICELLULA  
 (SEE EXPLANATION OF PLATES.)



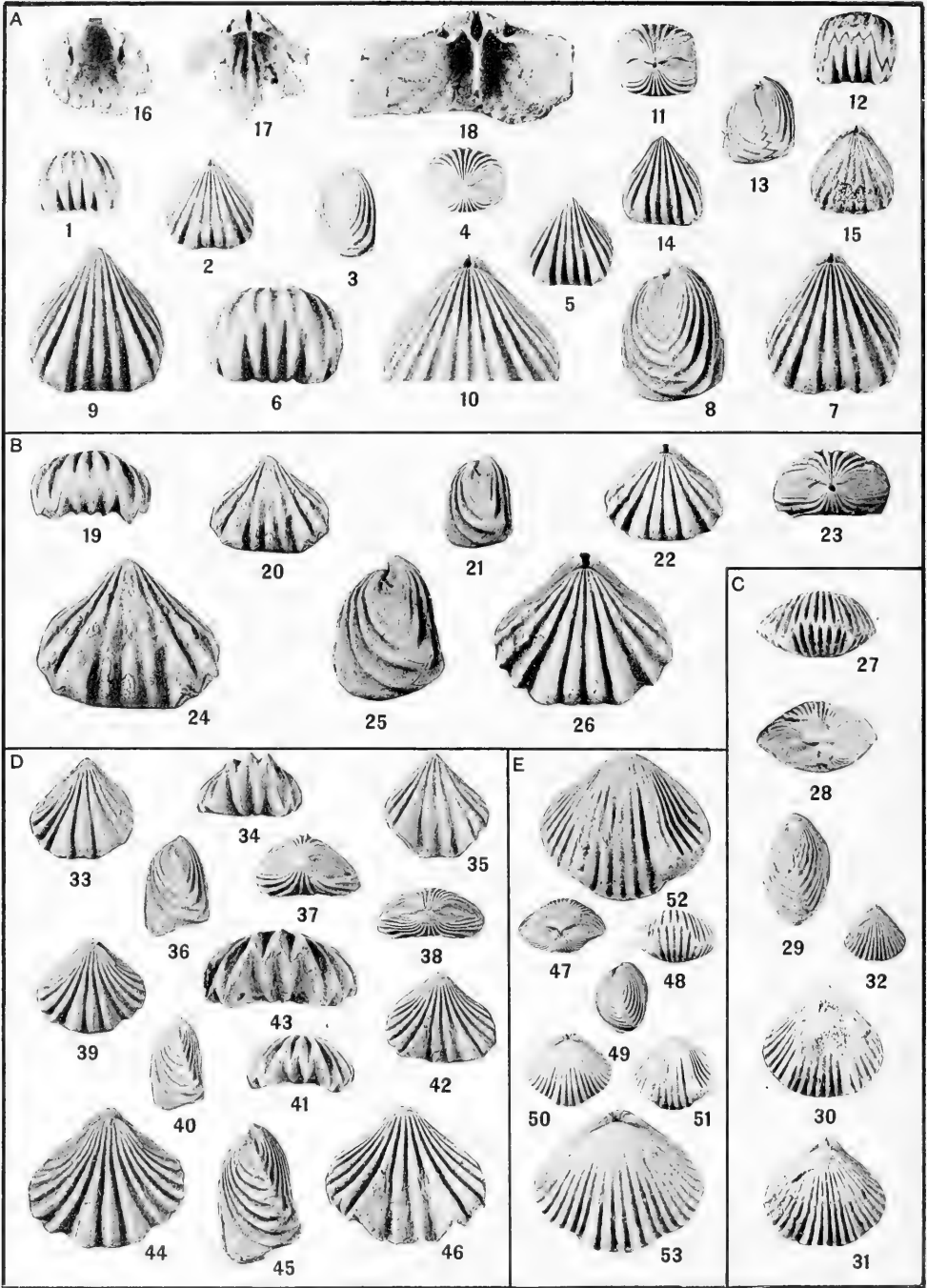
ROSTRICELLULA

(SEE EXPLANATION OF PLATES.)



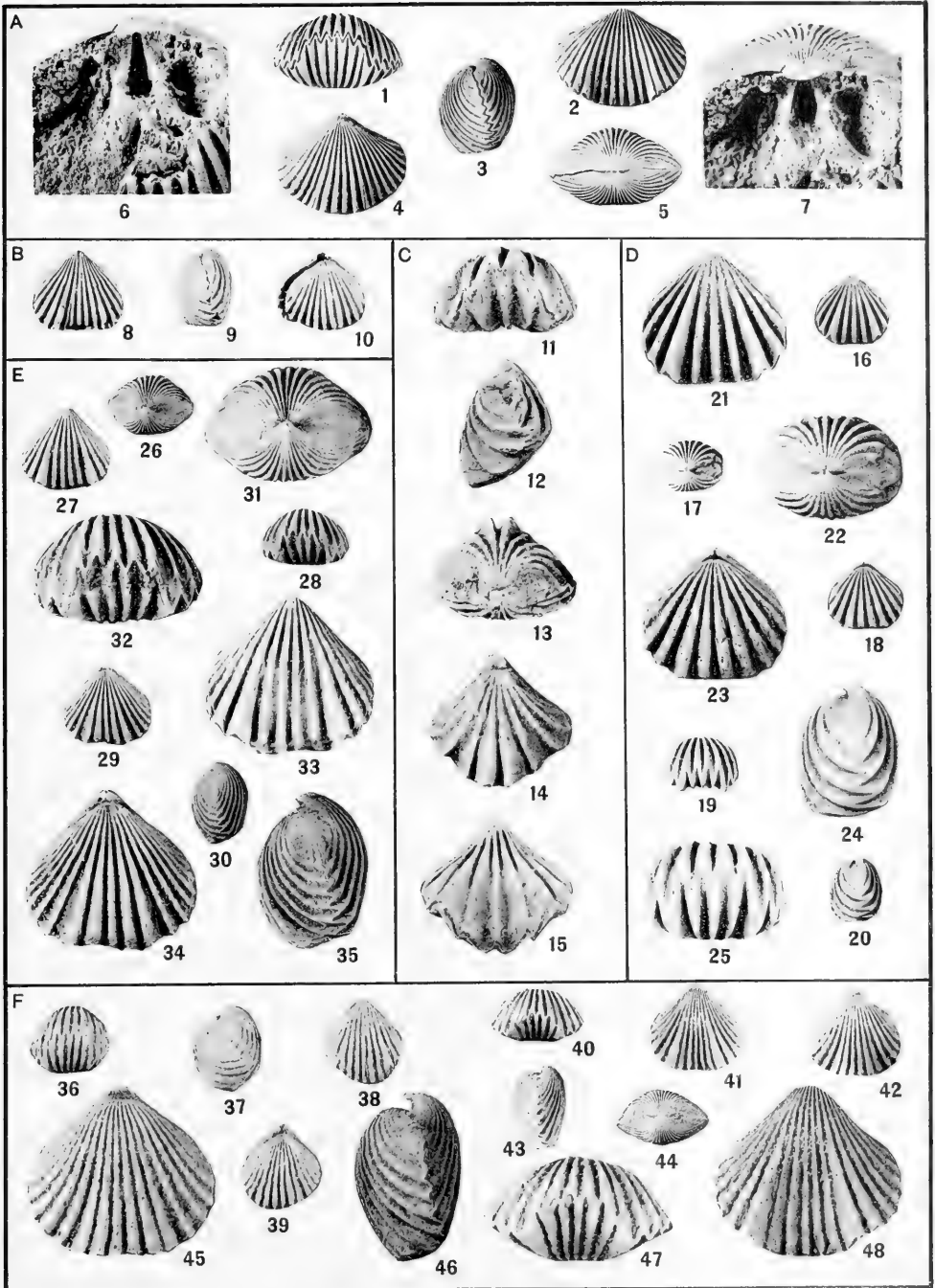


ROSTRICELLULA  
 (SEE EXPLANATION OF PLATES.)



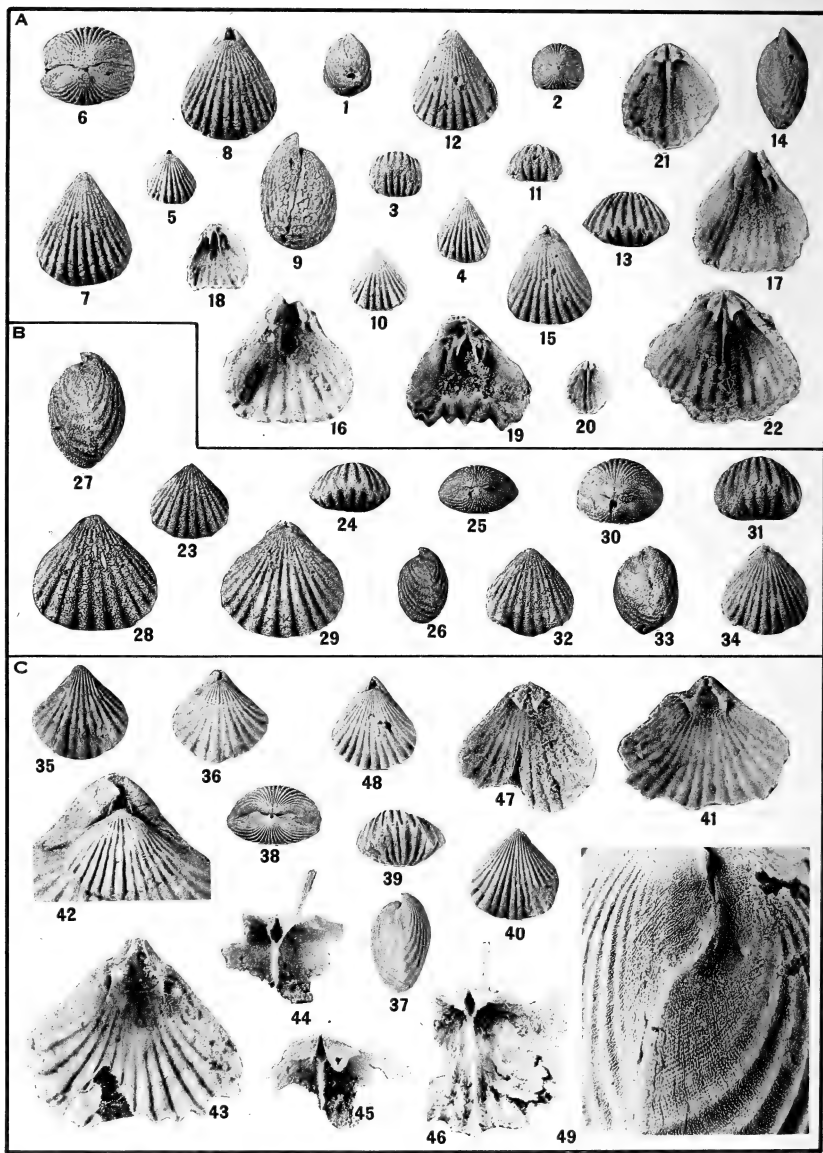
ROSTRICELLULA

(SEE EXPLANATION OF PLATES.)



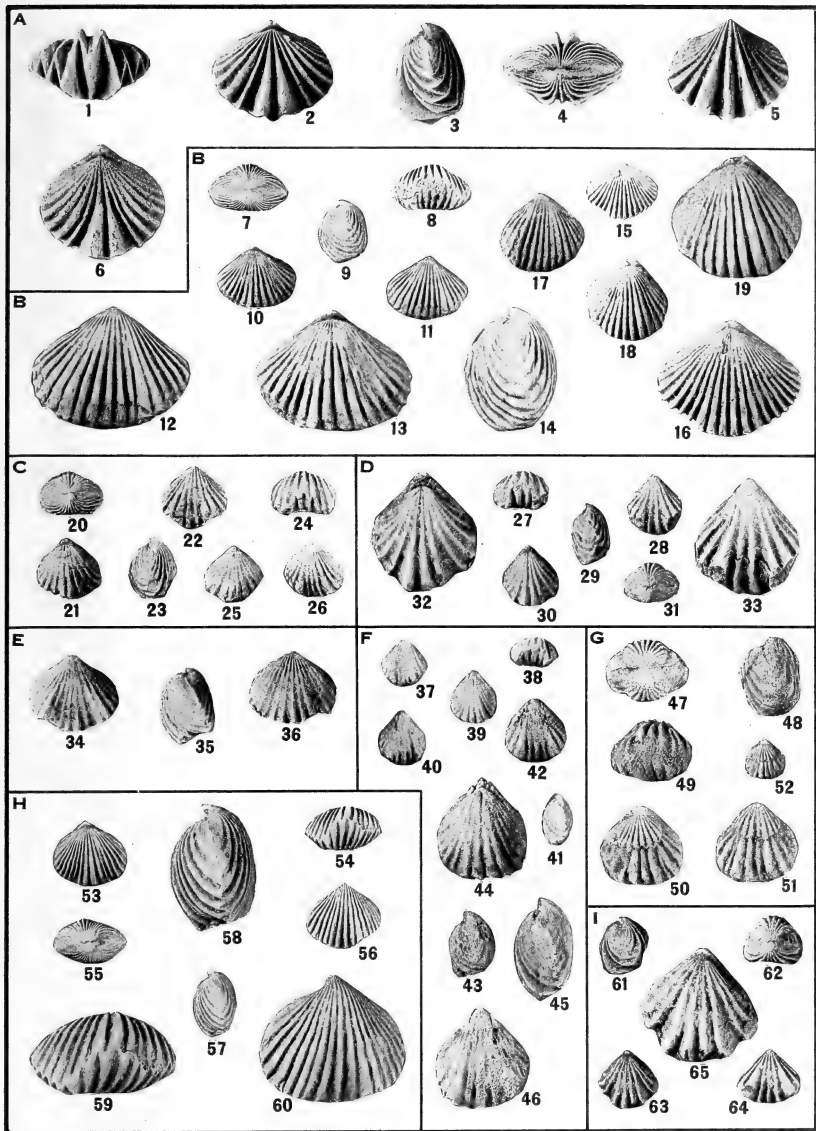
ROSTRICELLULA

(SEE EXPLANATION OF PLATES.)



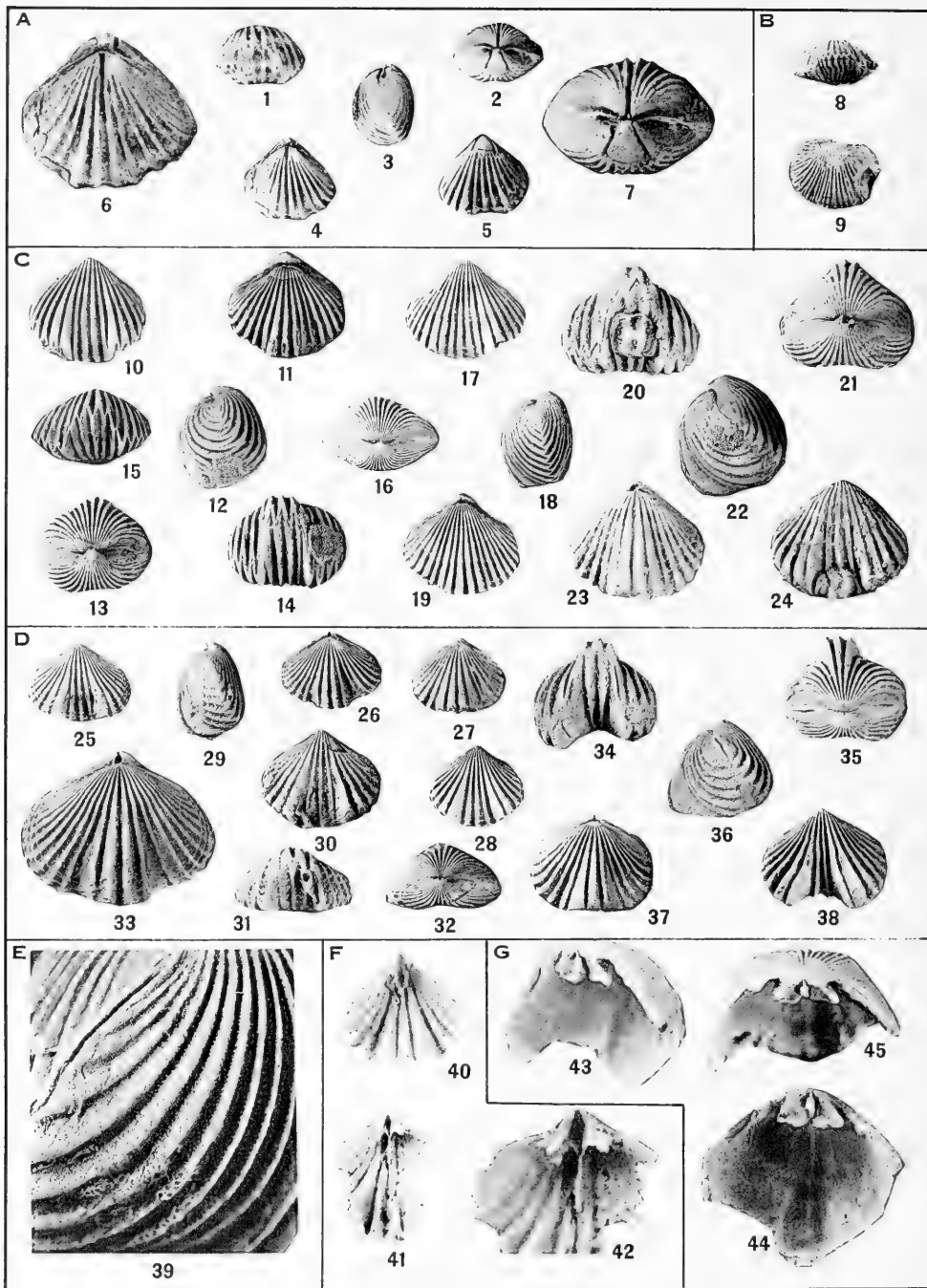
ROSTRICELLULA

(SEE EXPLANATION OF PLATES.)



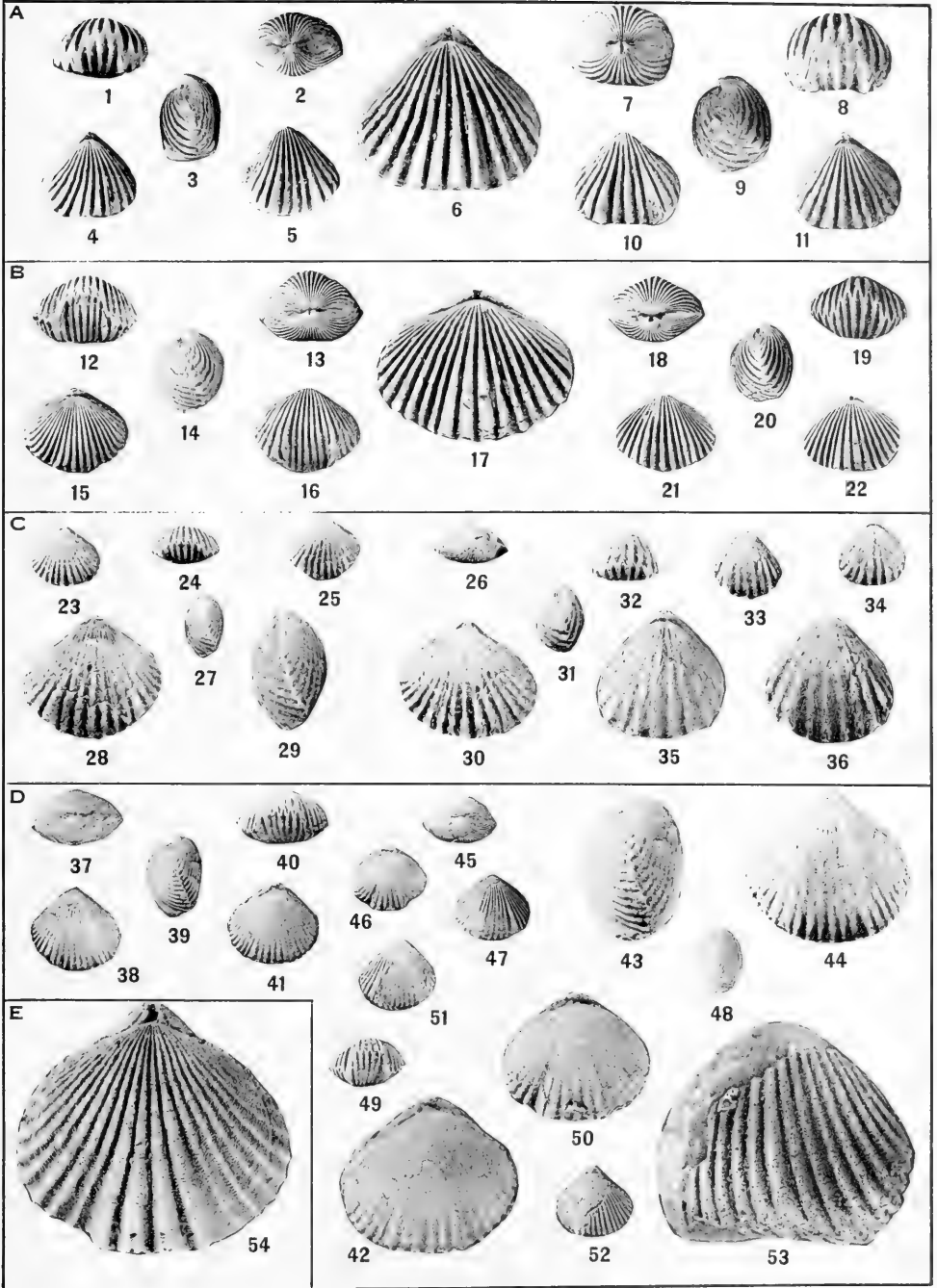
ROSTRICELLULA

(SEE EXPLANATION OF PLATES.)



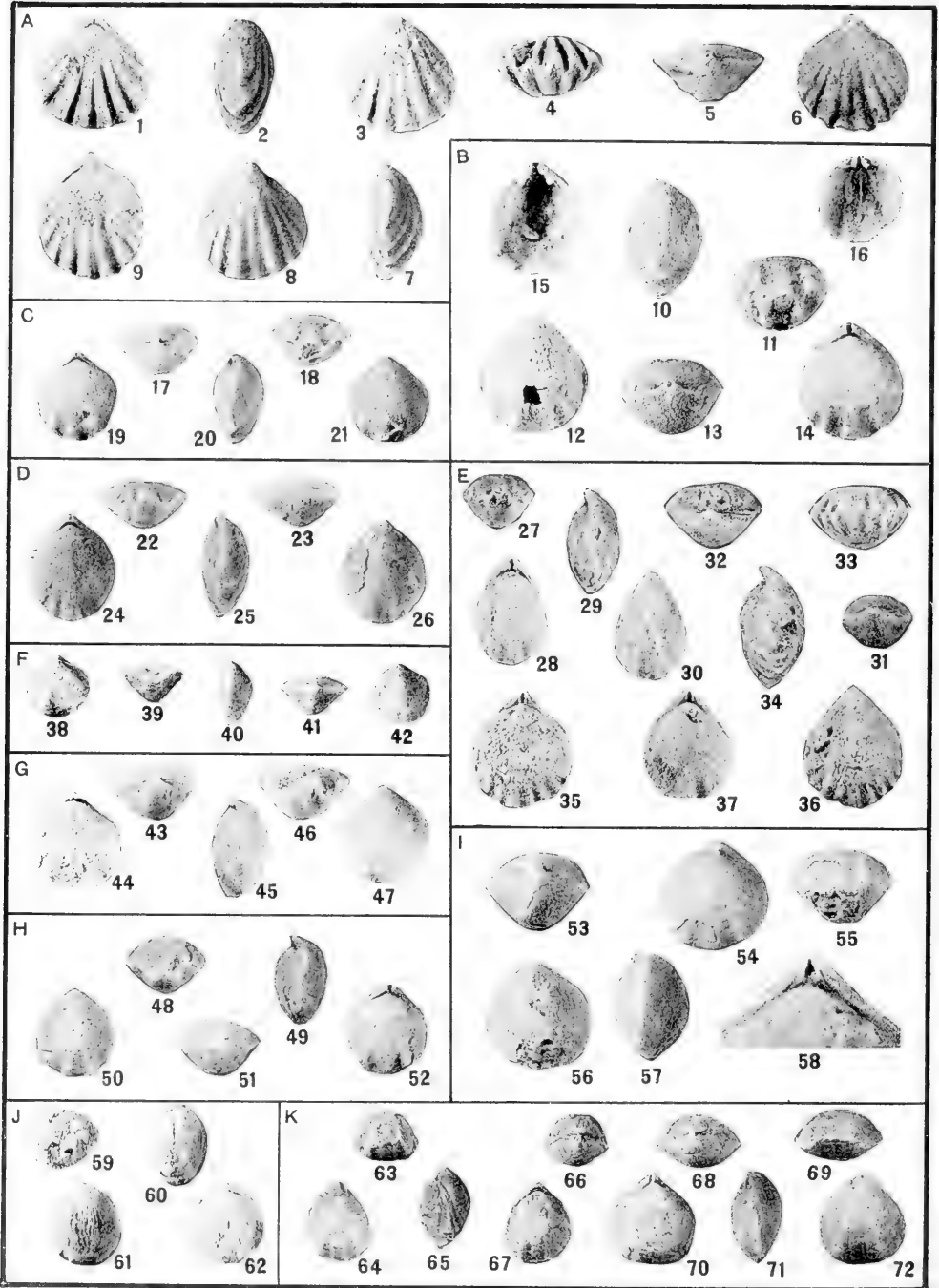
OXOPLECIA, PLECTOCAMARA, RHYNCHOTREMA, ROSTRICELLULA

(SEE EXPLANATION OF PLATES.)



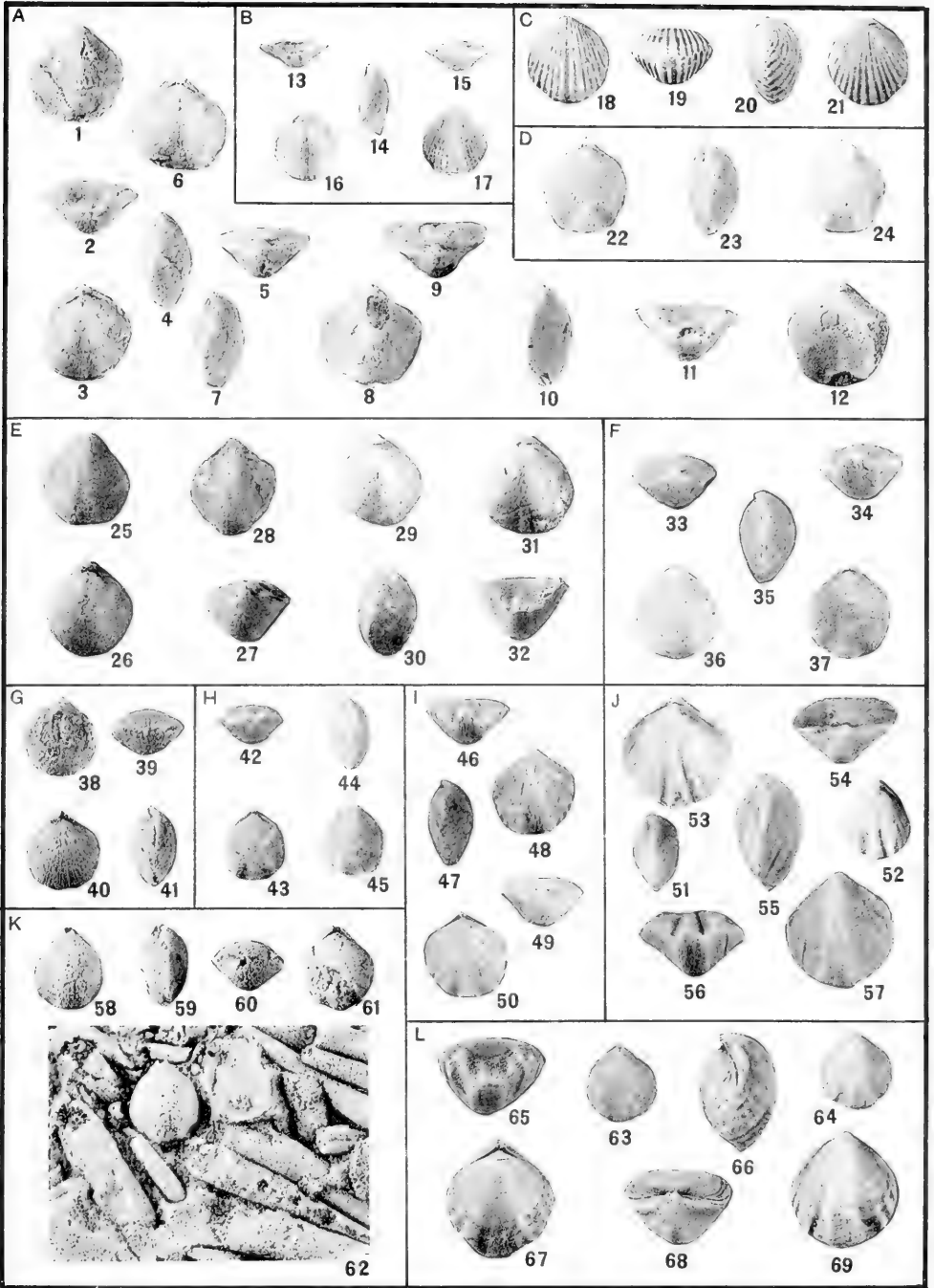
ROSTRICELLULA

(SEE EXPLANATION OF PLATES.)



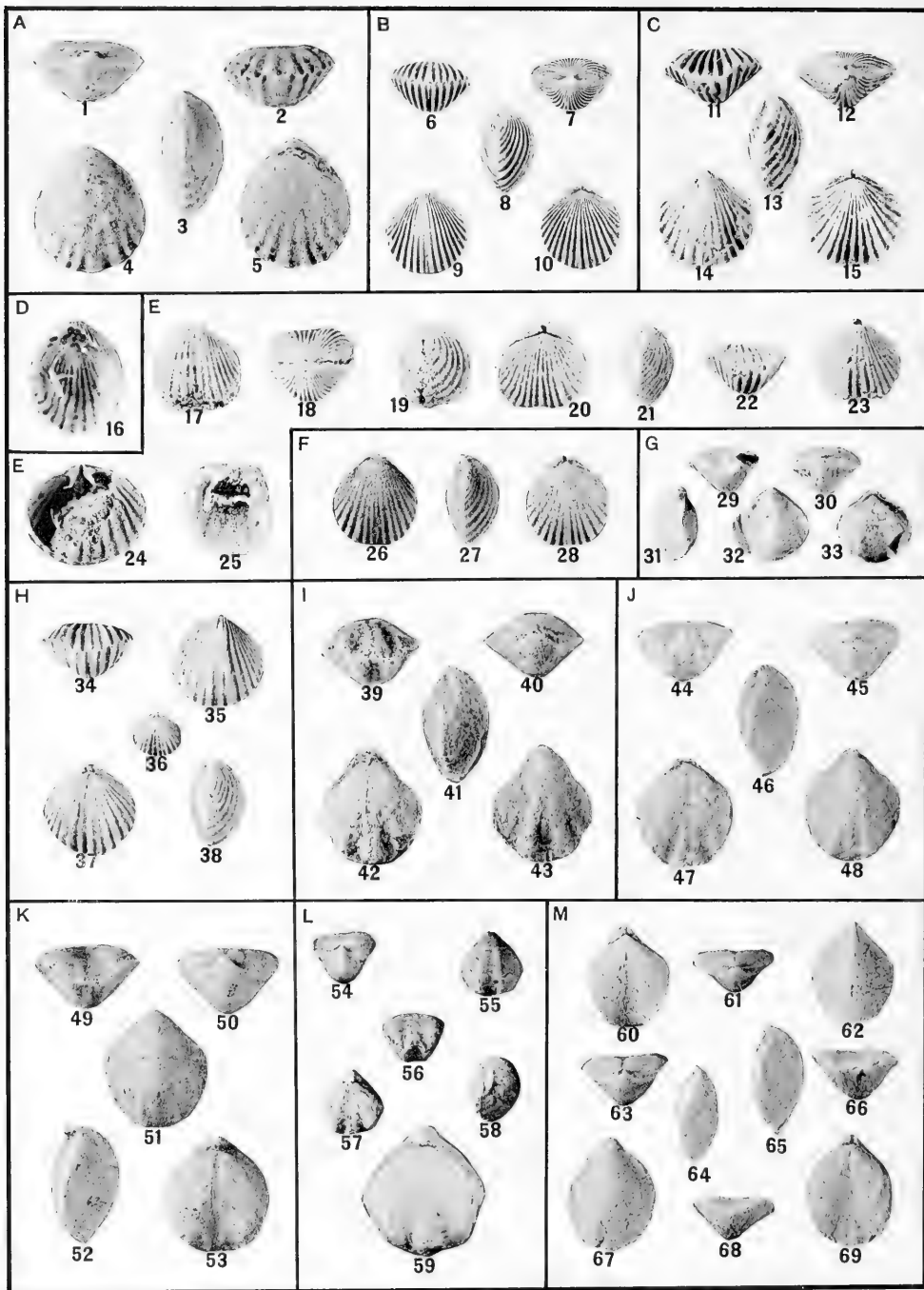
IDIOSPIRA, PROTOZYGA  
(SEE EXPLANATION OF PLATES.)





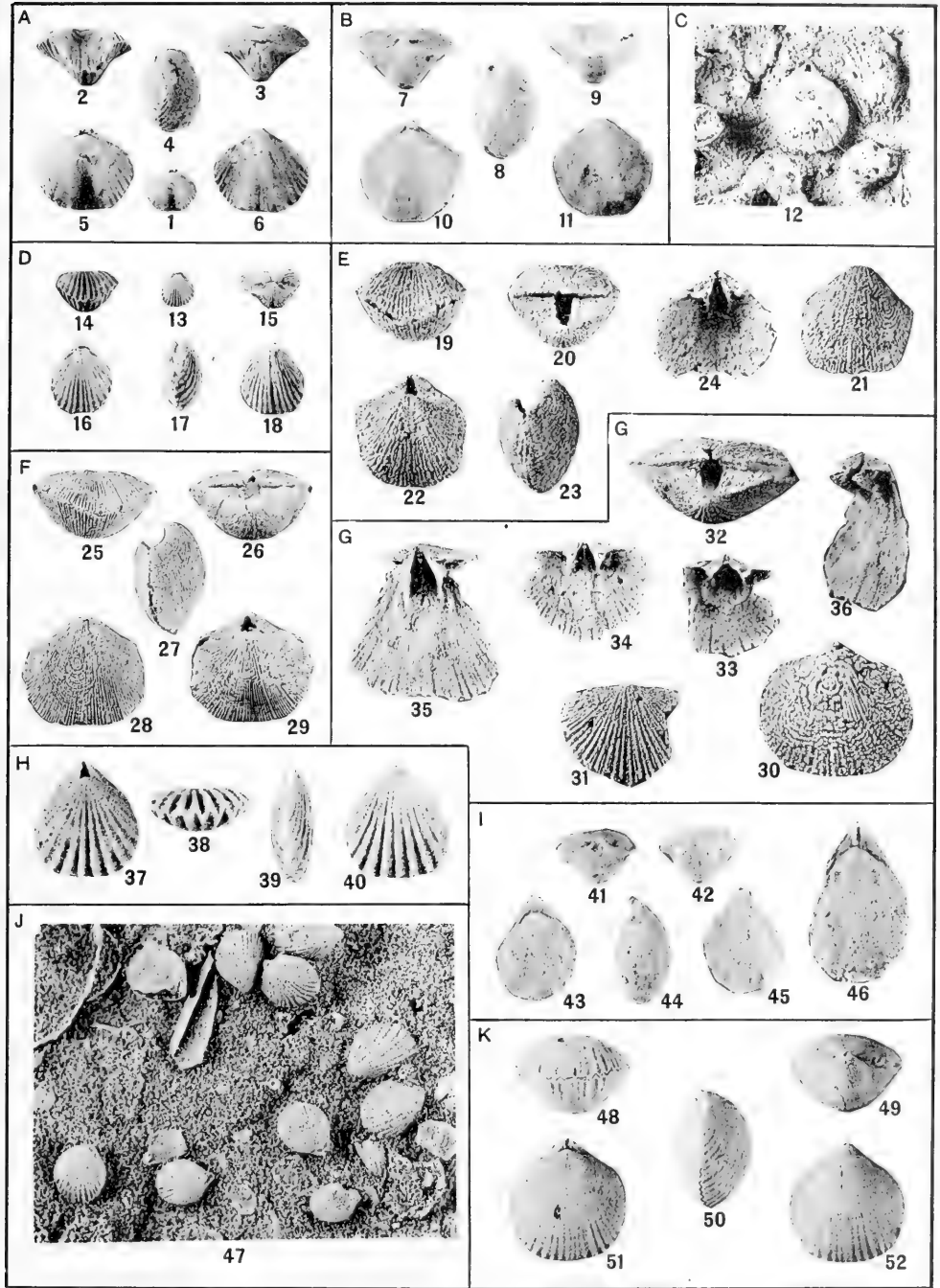
CYCLOSPIRA, PROTOZYGA, ZYGOSPIRA

(SEE EXPLANATION OF PLATES.)



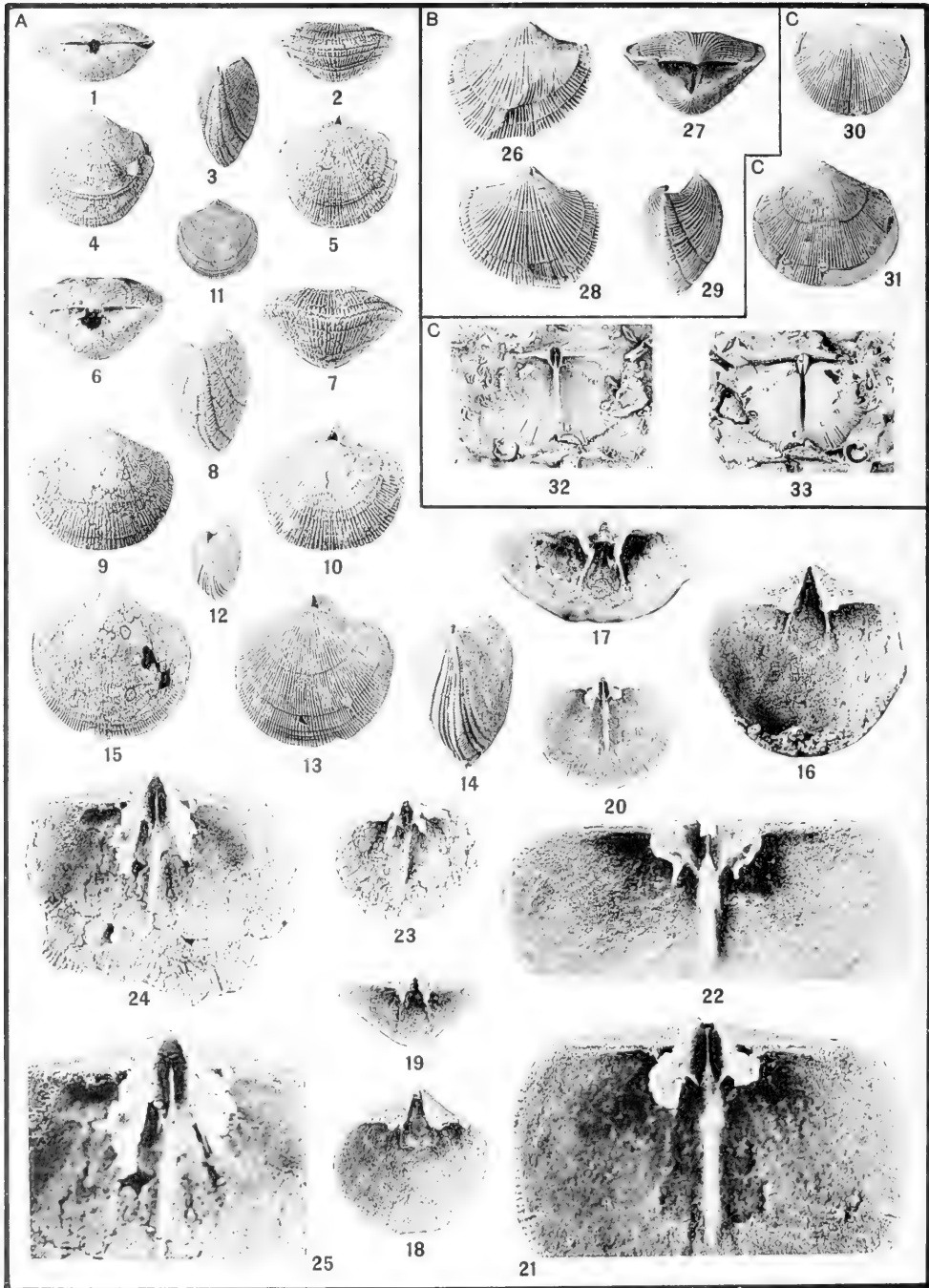
## CYCLOSPIRA, HALLINA, PROTOZYGA, ZYGOSPIRA

(SEE EXPLANATION OF PLATES.)



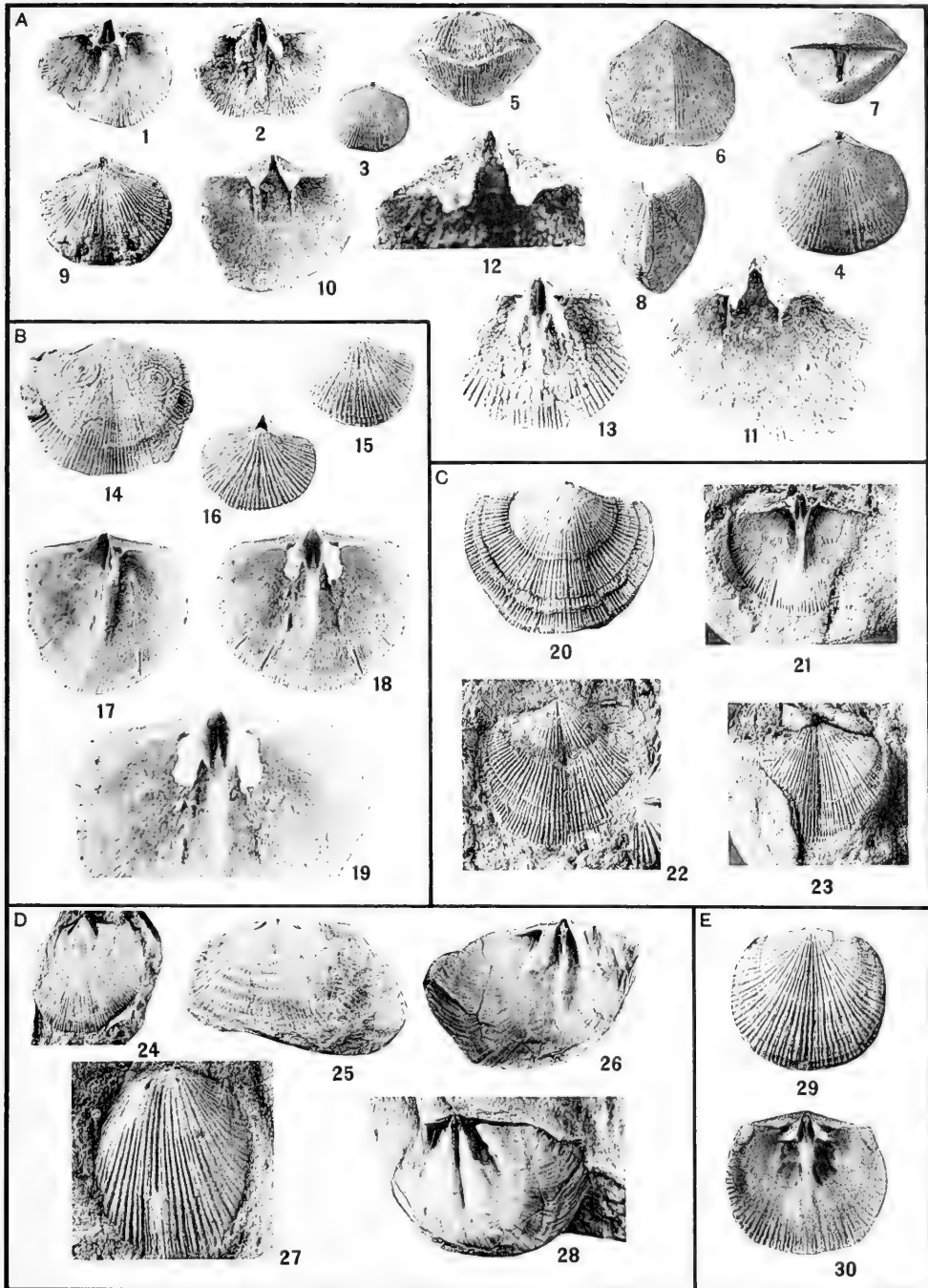
CYCLOSPIRA, FASCIFERA, HALLINA, LATICRURA, PROTOZYGA, SPHENOTRETA,  
 ZYGOSPIRA

(SEE EXPLANATION OF PLATES.)



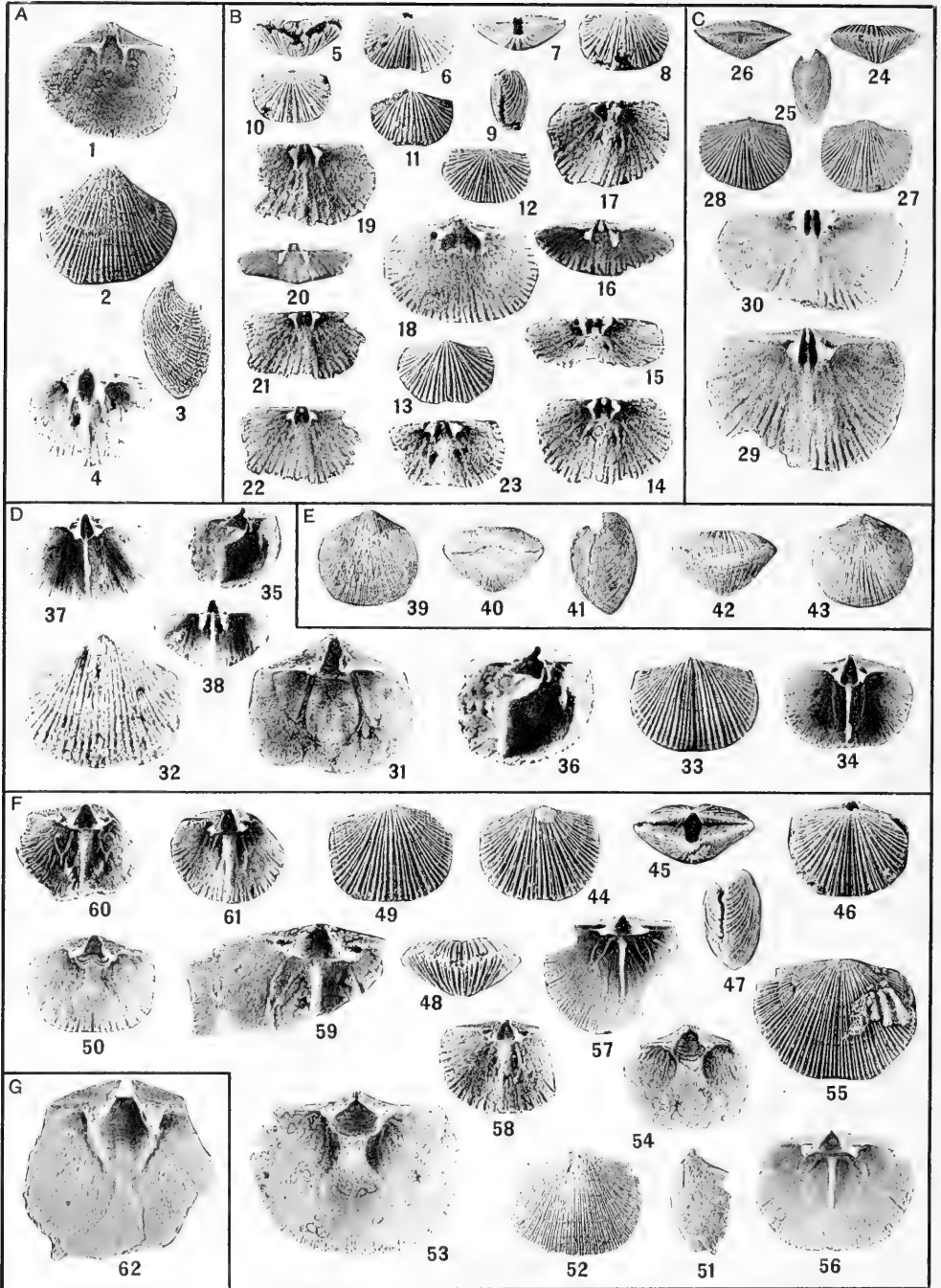
LATICRURA

(SEE EXPLANATION OF PLATES.)



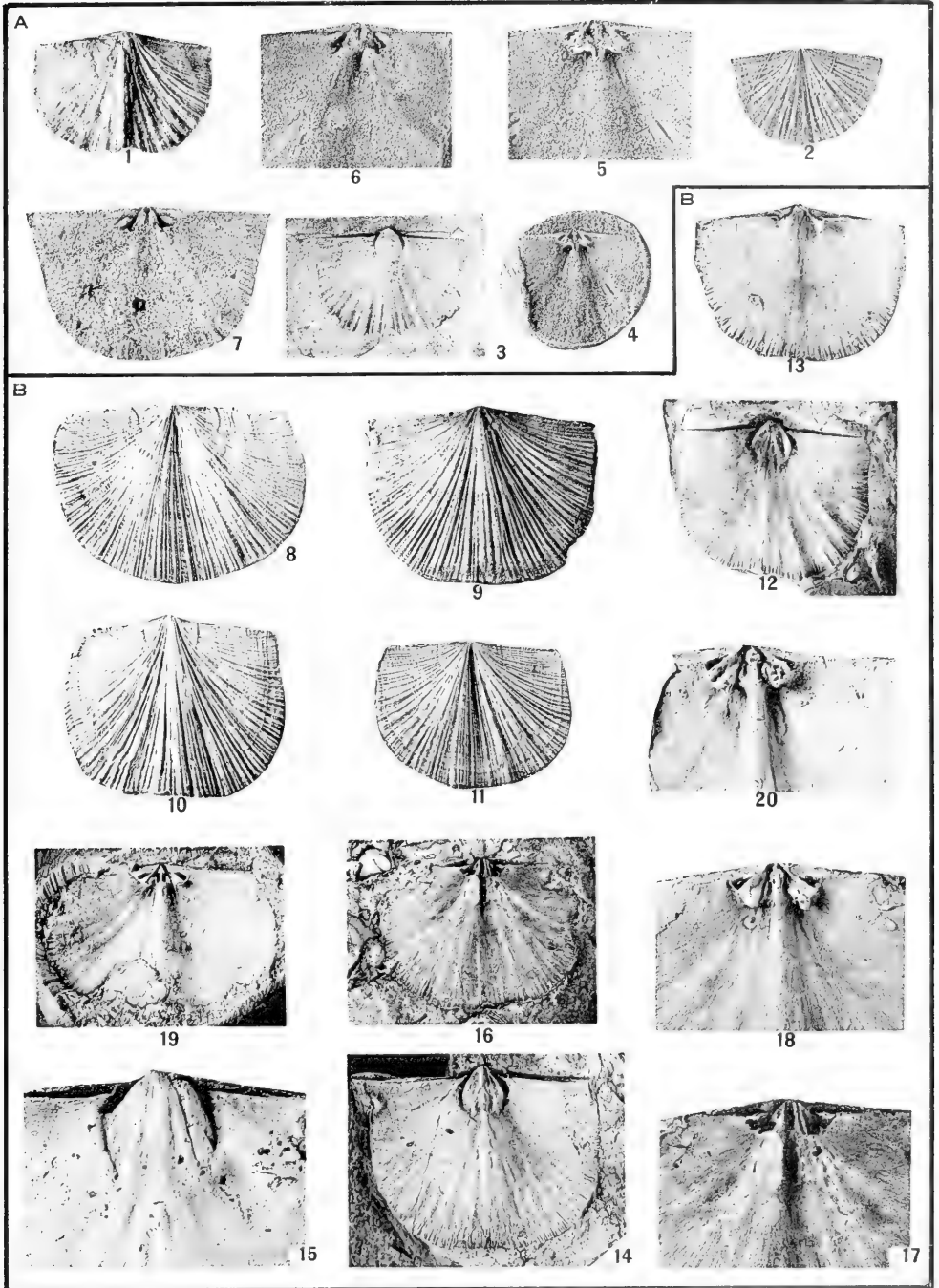
HIRNANTIA, HOWELLITES, LATICRURA

(SEE EXPLANATION OF PLATES.)



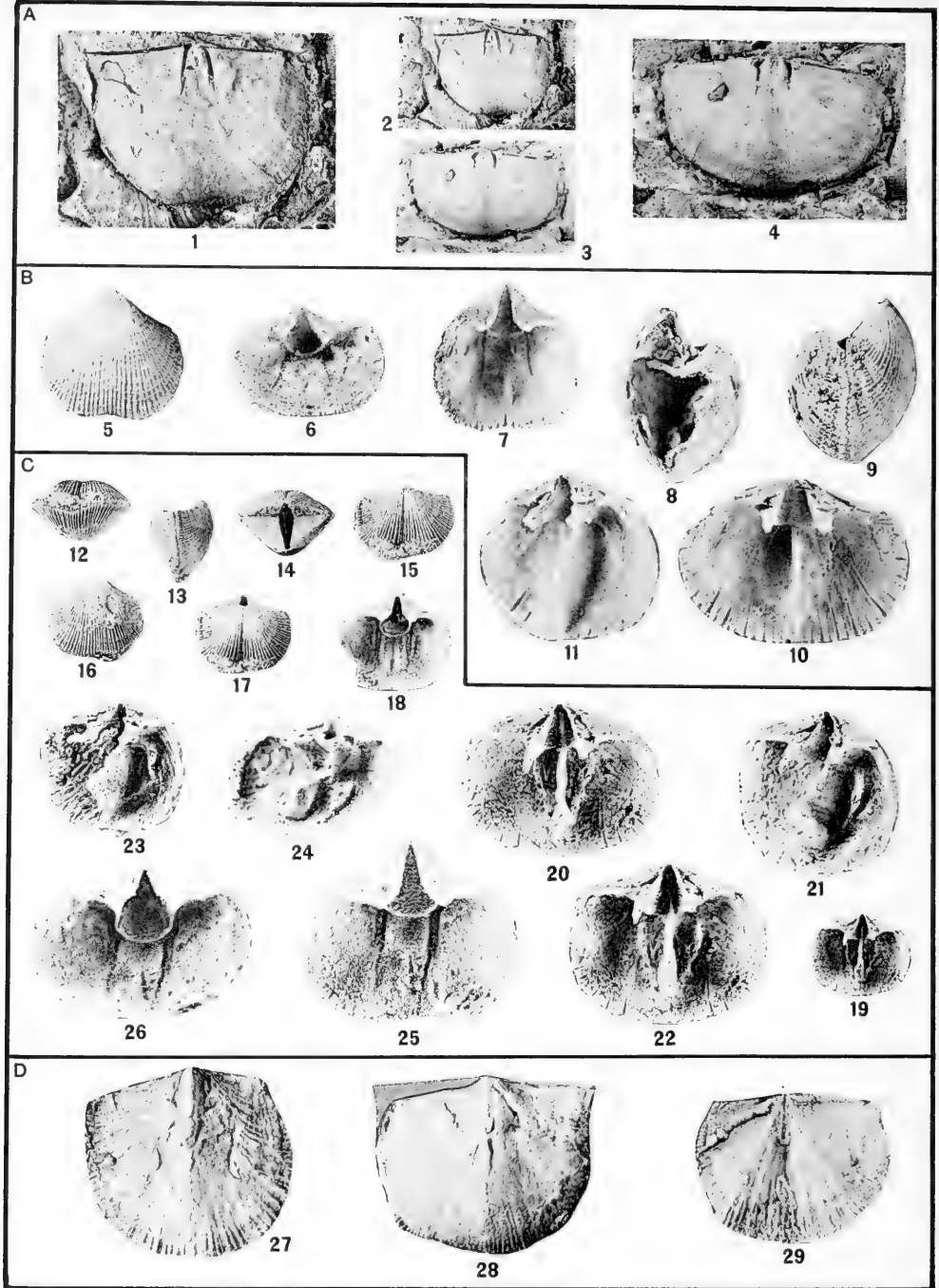
CYCLOMYONIA, DALMANELLA, DIORTHELASMA, EREMOTREMA, LATOCRURA, PAURORTHIS, PHRAGMORTHIS

(SEE EXPLANATION OF PLATES.)



REUSCHELLA

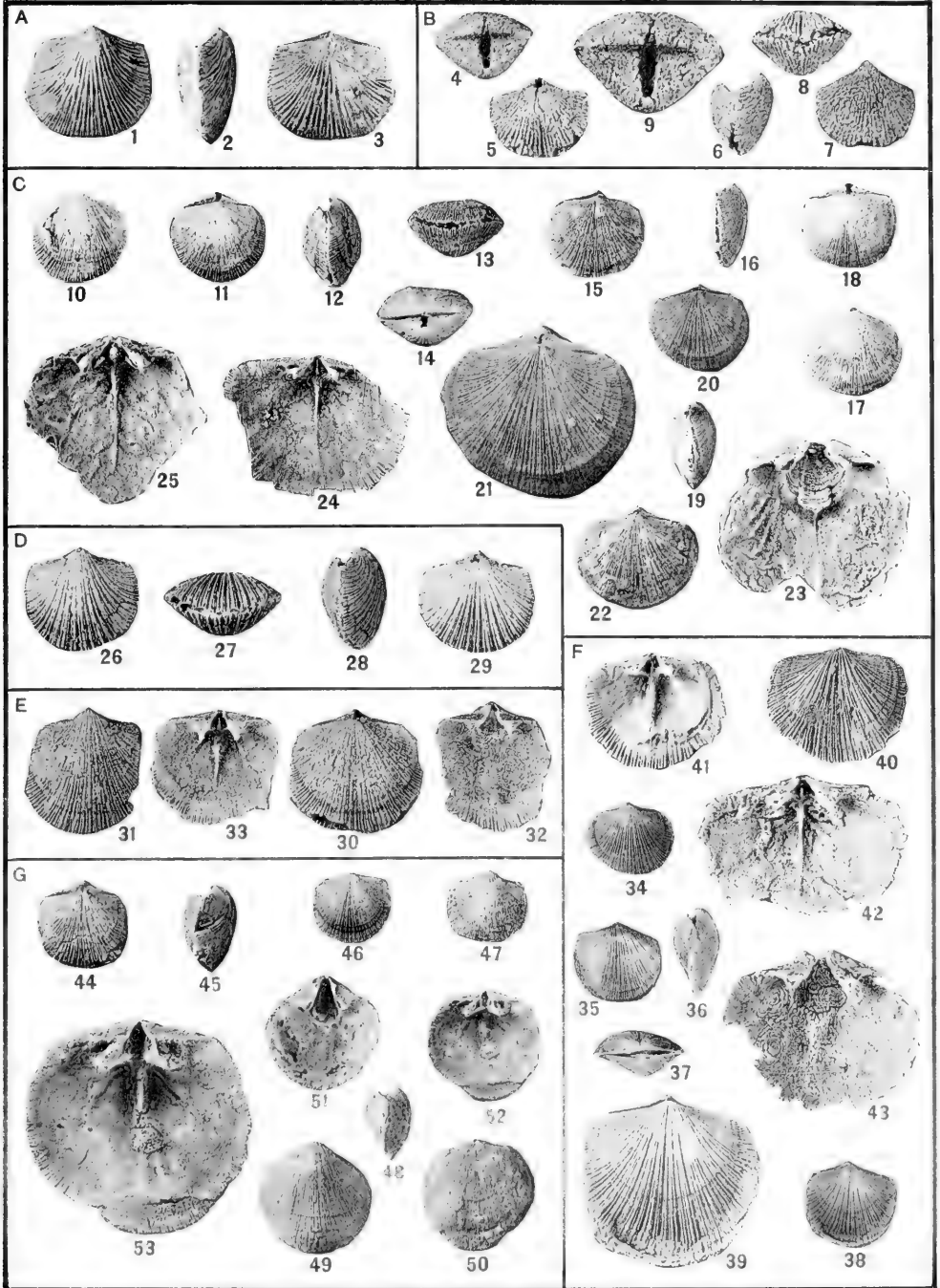
(SEE EXPLANATION OF PLATES.)



GENUS & SPECIES UNDET., PHRAGMORTHIS, REUSCHELLA

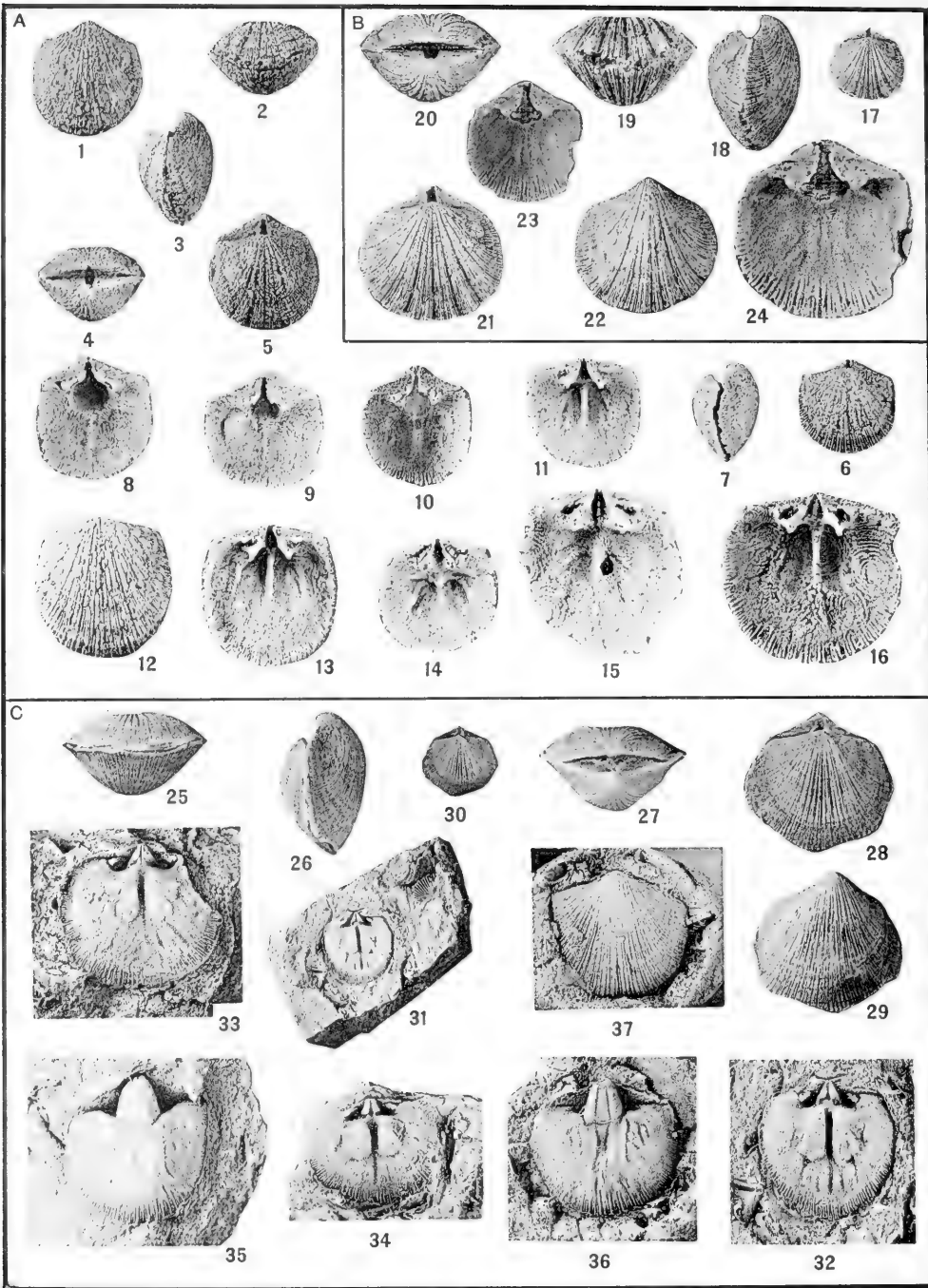
(SEE EXPLANATION OF PLATES.)





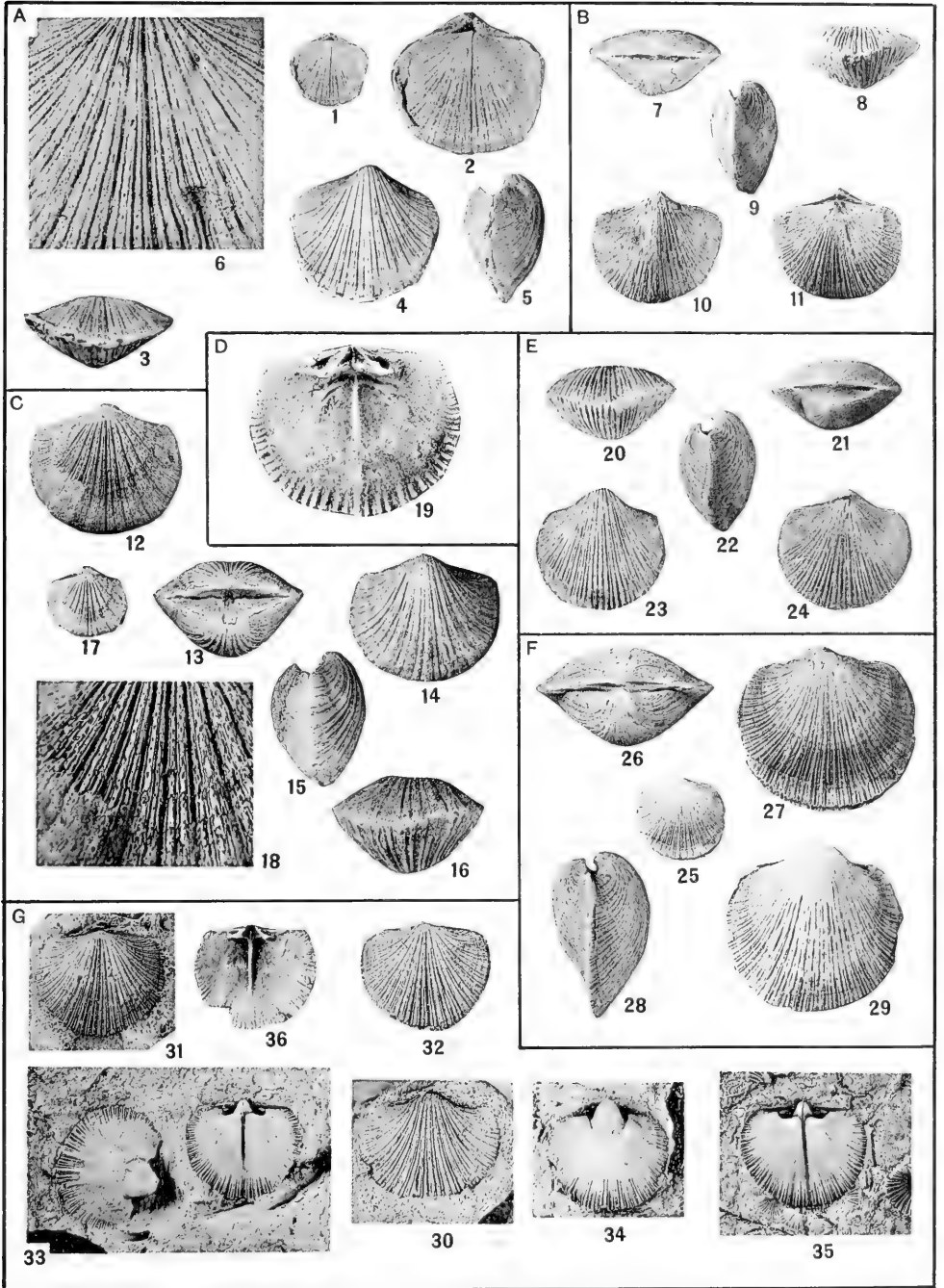
FASCIFERA, LATICRURA, PAURORTHIS

(SEE EXPLANATION OF PLATES.)



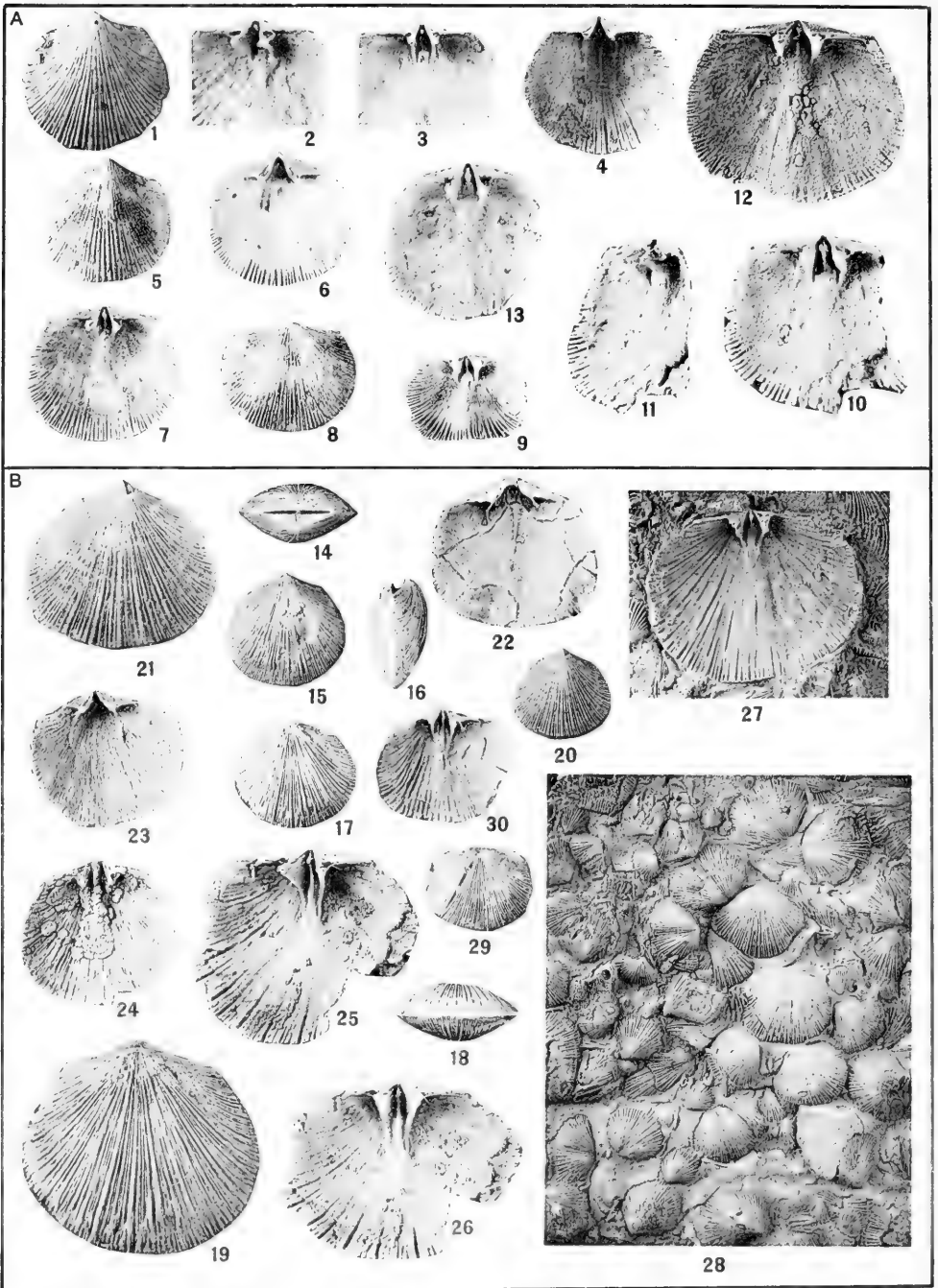
PAURORTHIS

(SEE EXPLANATION OF PLATES.)



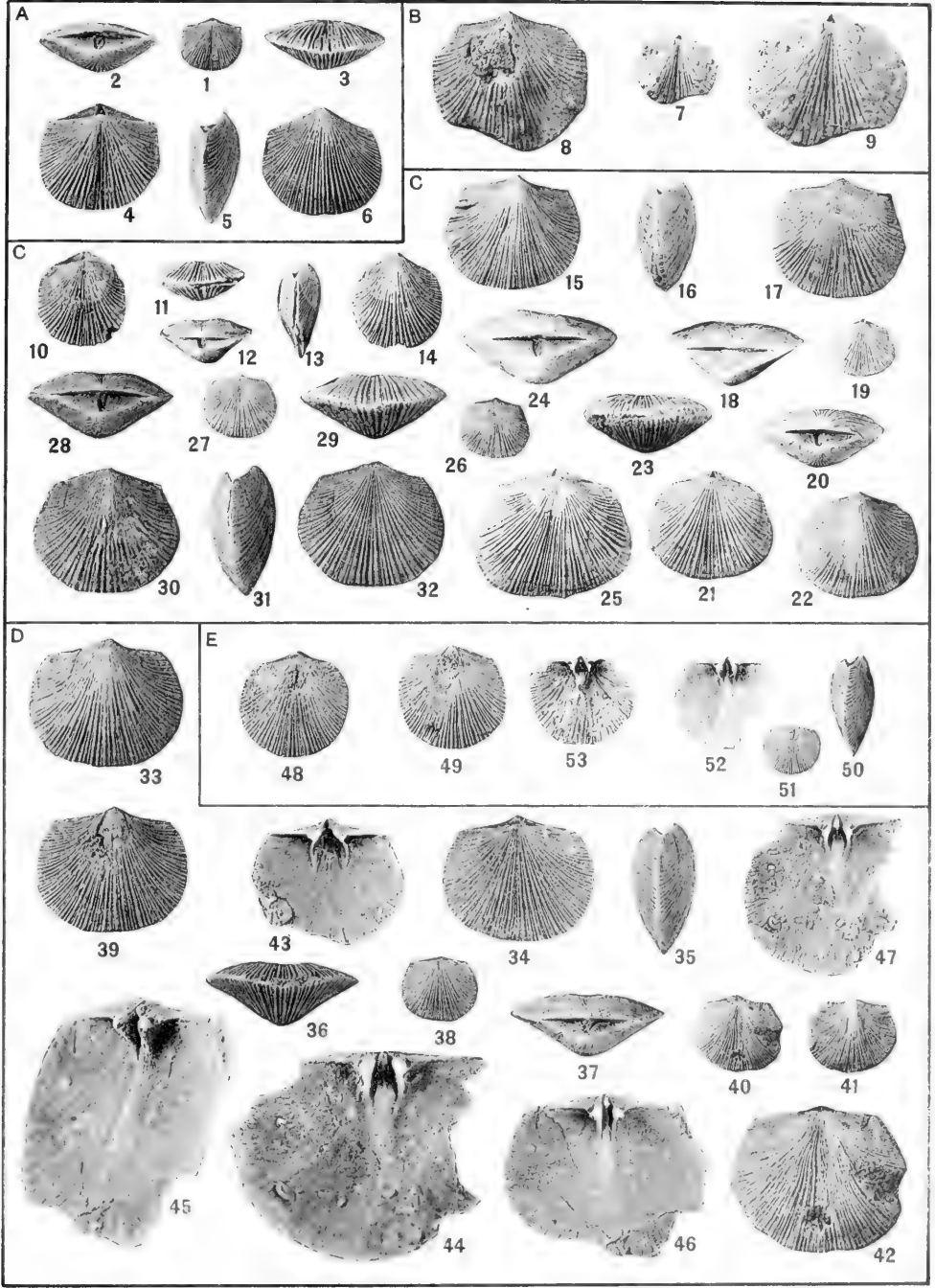
PAURORTHIS

(SEE EXPLANATION OF PLATES.)



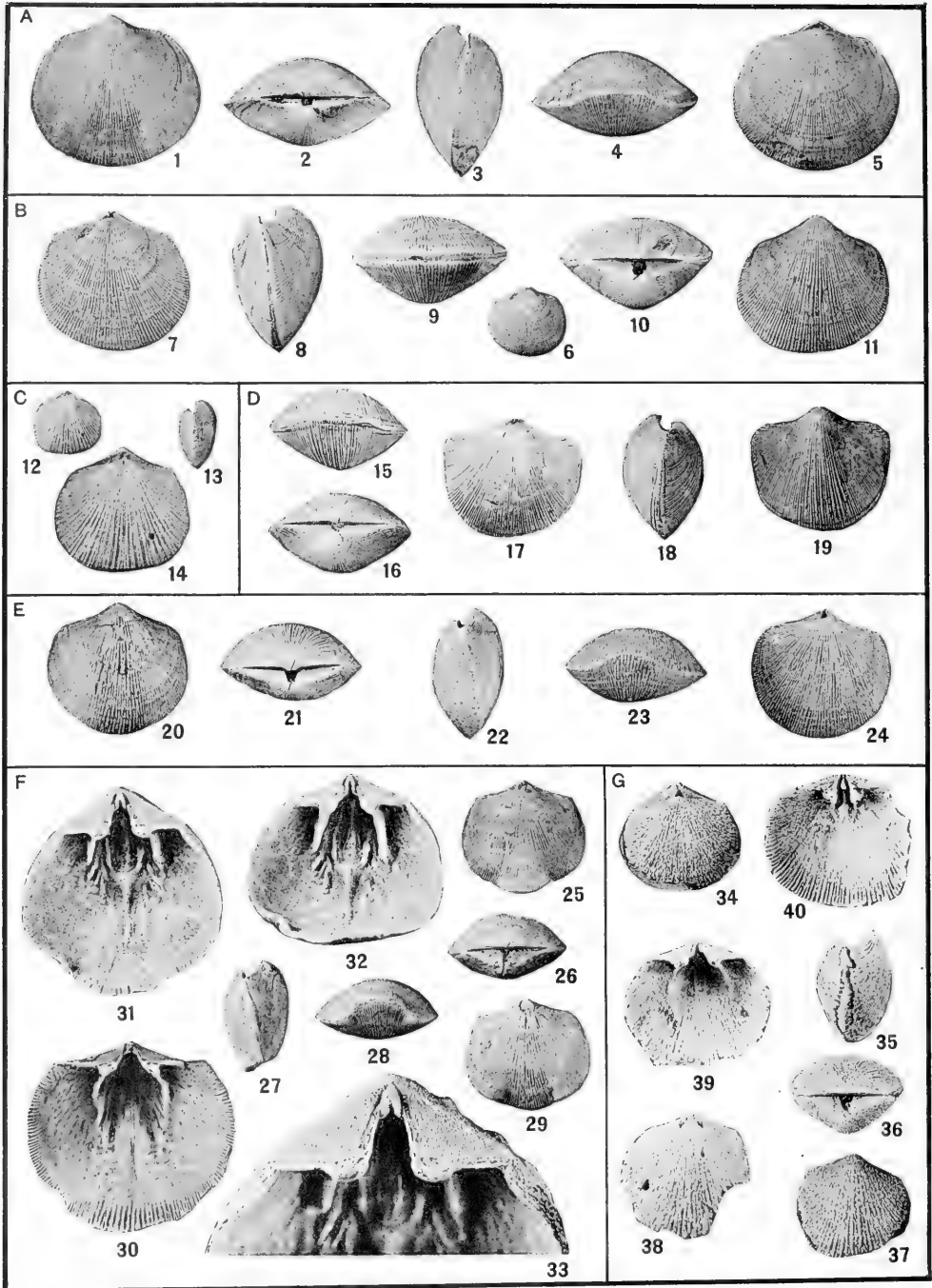
FASCIFERA

(SEE EXPLANATION OF PLATES.)



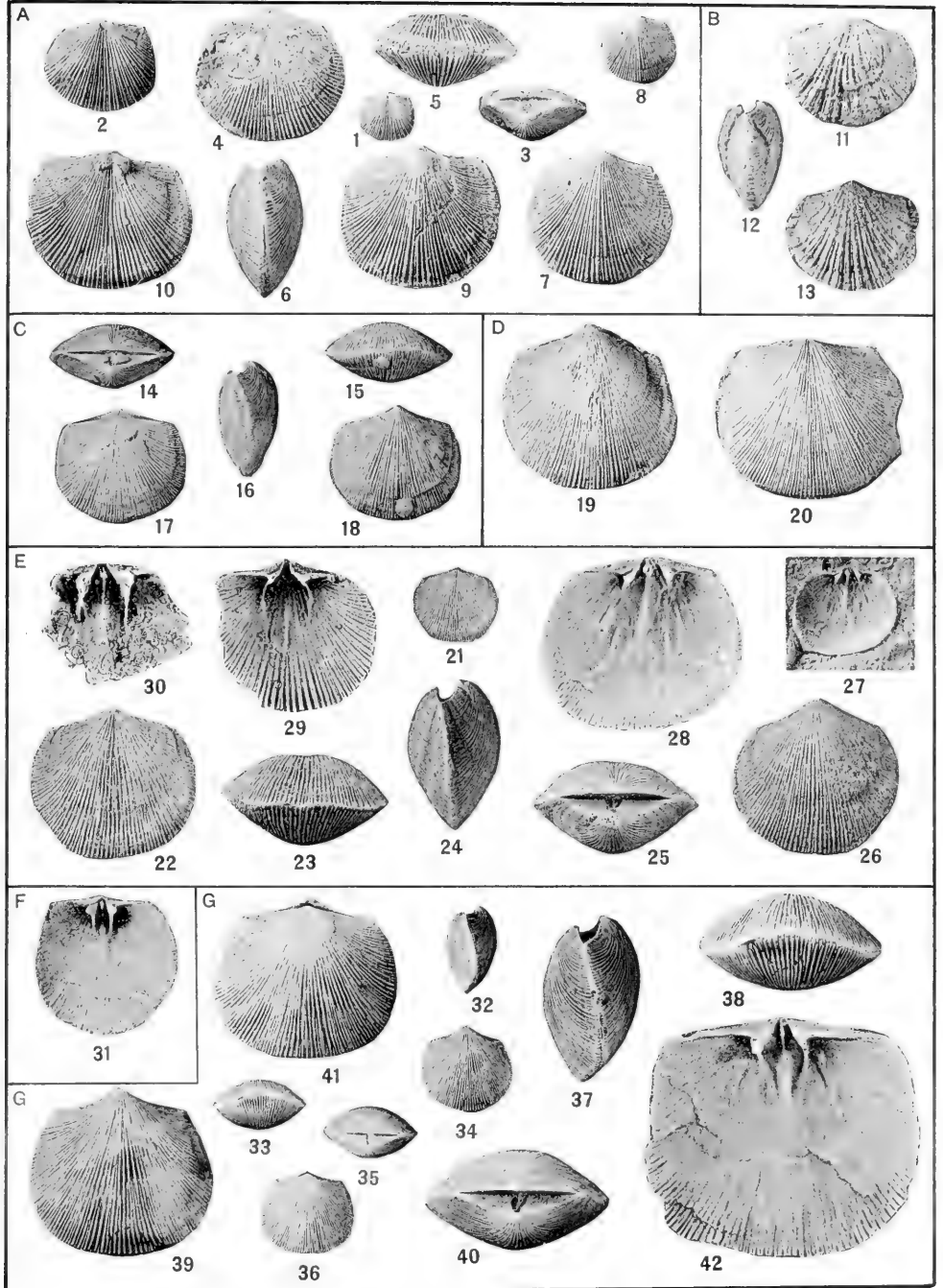
FASCIFERA

(SEE EXPLANATION OF PLATES.)

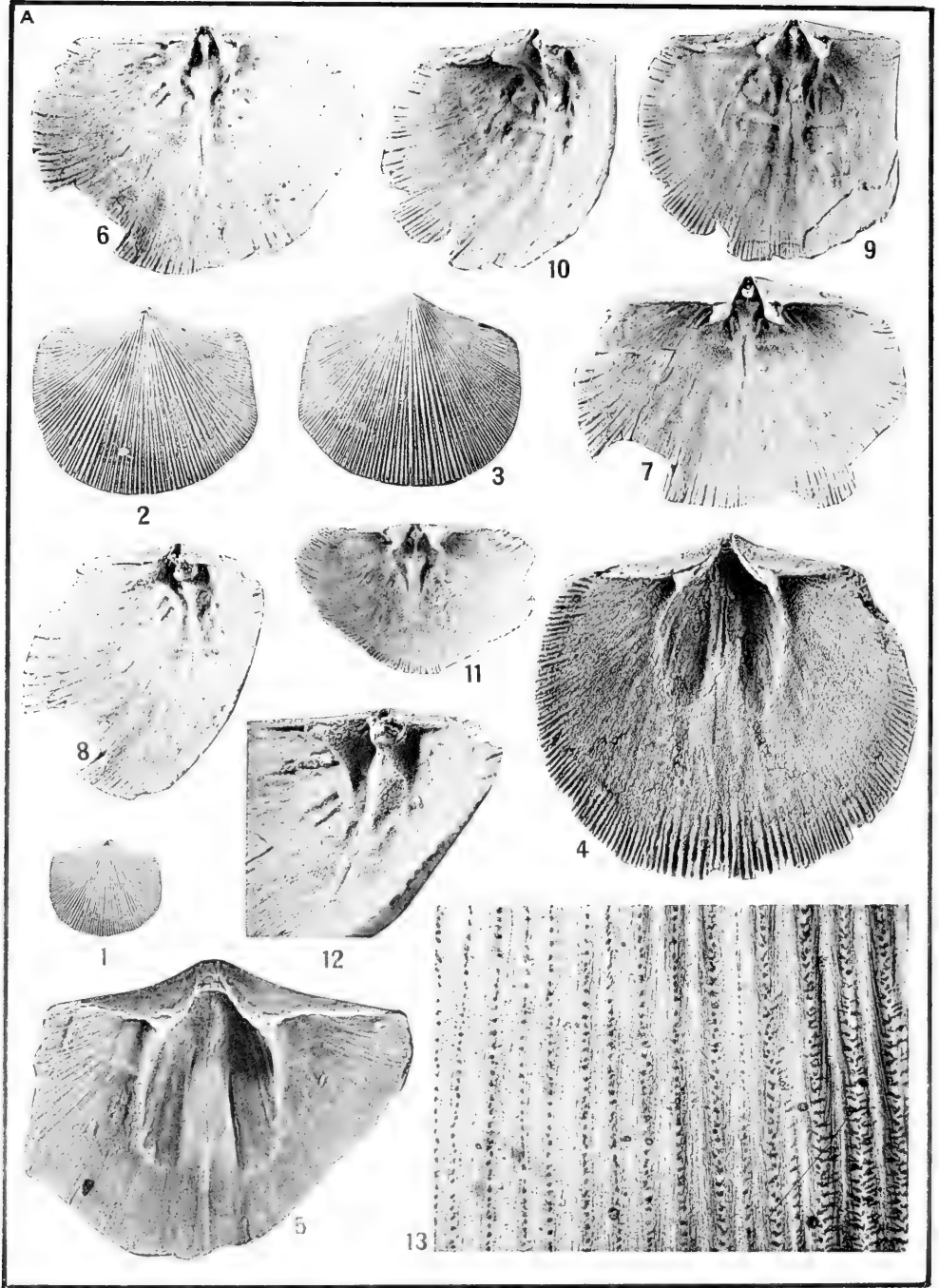


PIONODEMA

(SEE EXPLANATION OF PLATES.)



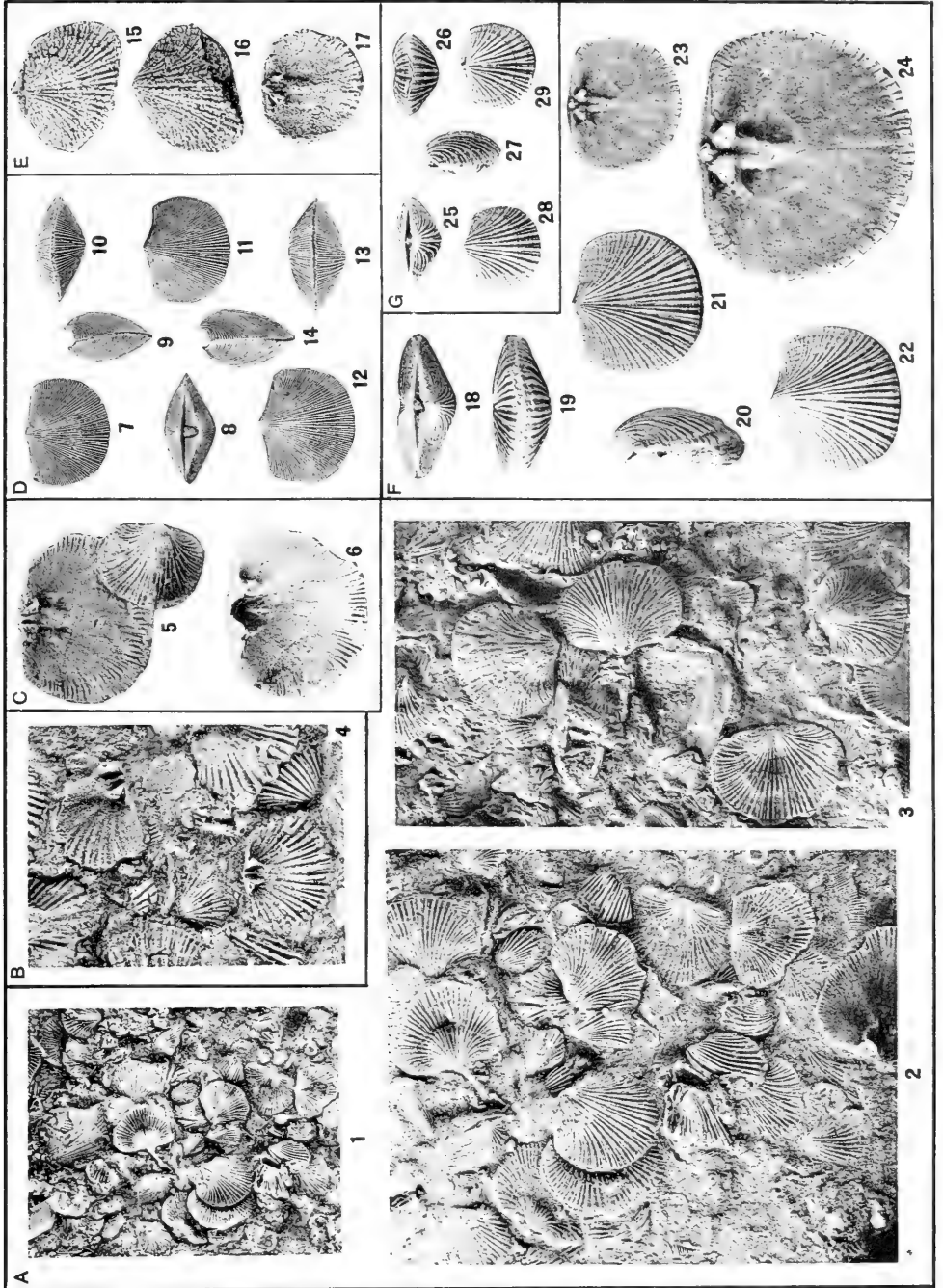
FASCIFERA, PAURORTHIS, PIONODEMA  
(SEE EXPLANATION OF PLATES.)



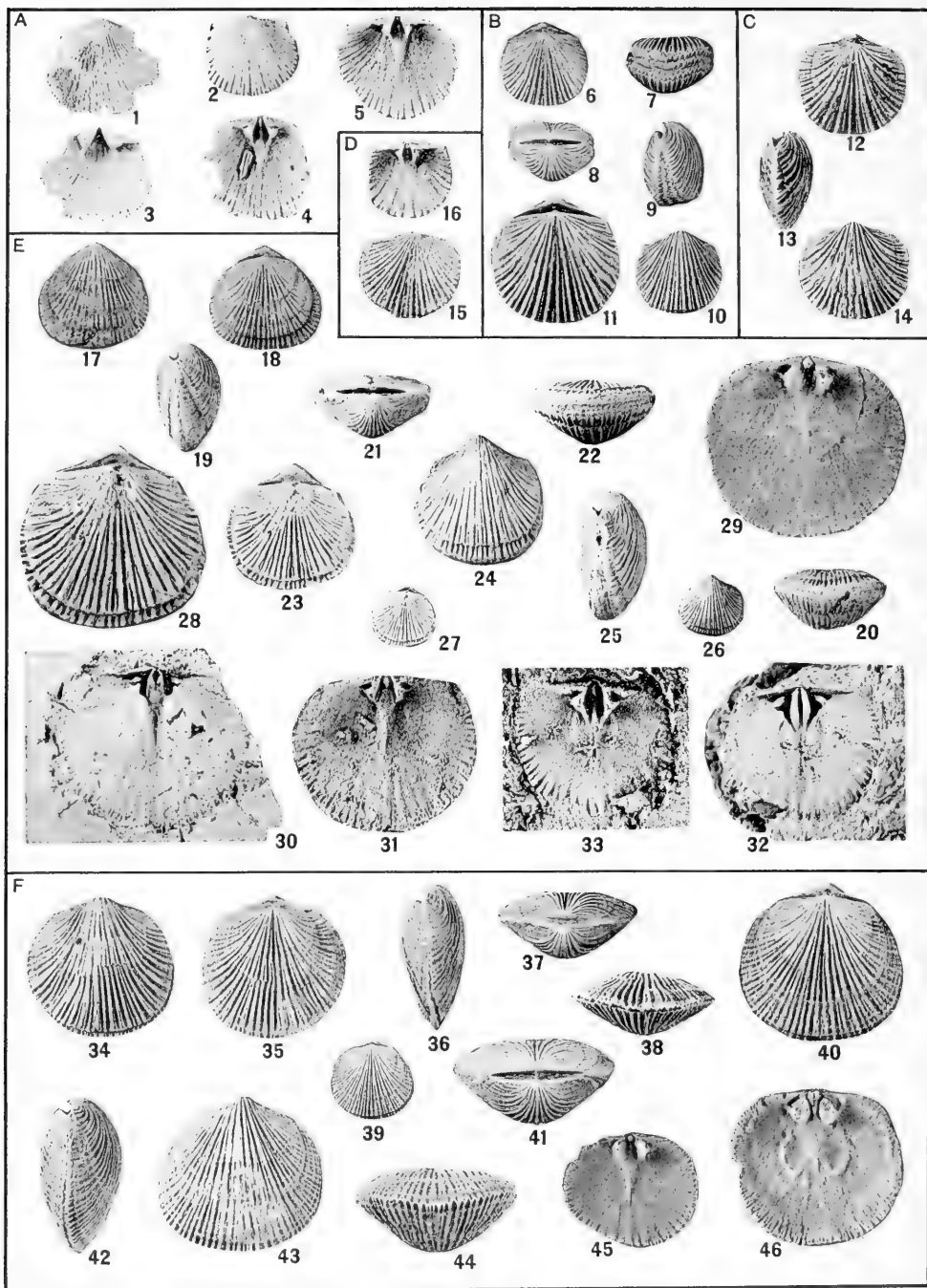
PIONODEMA

(SEE EXPLANATION OF PLATES.)

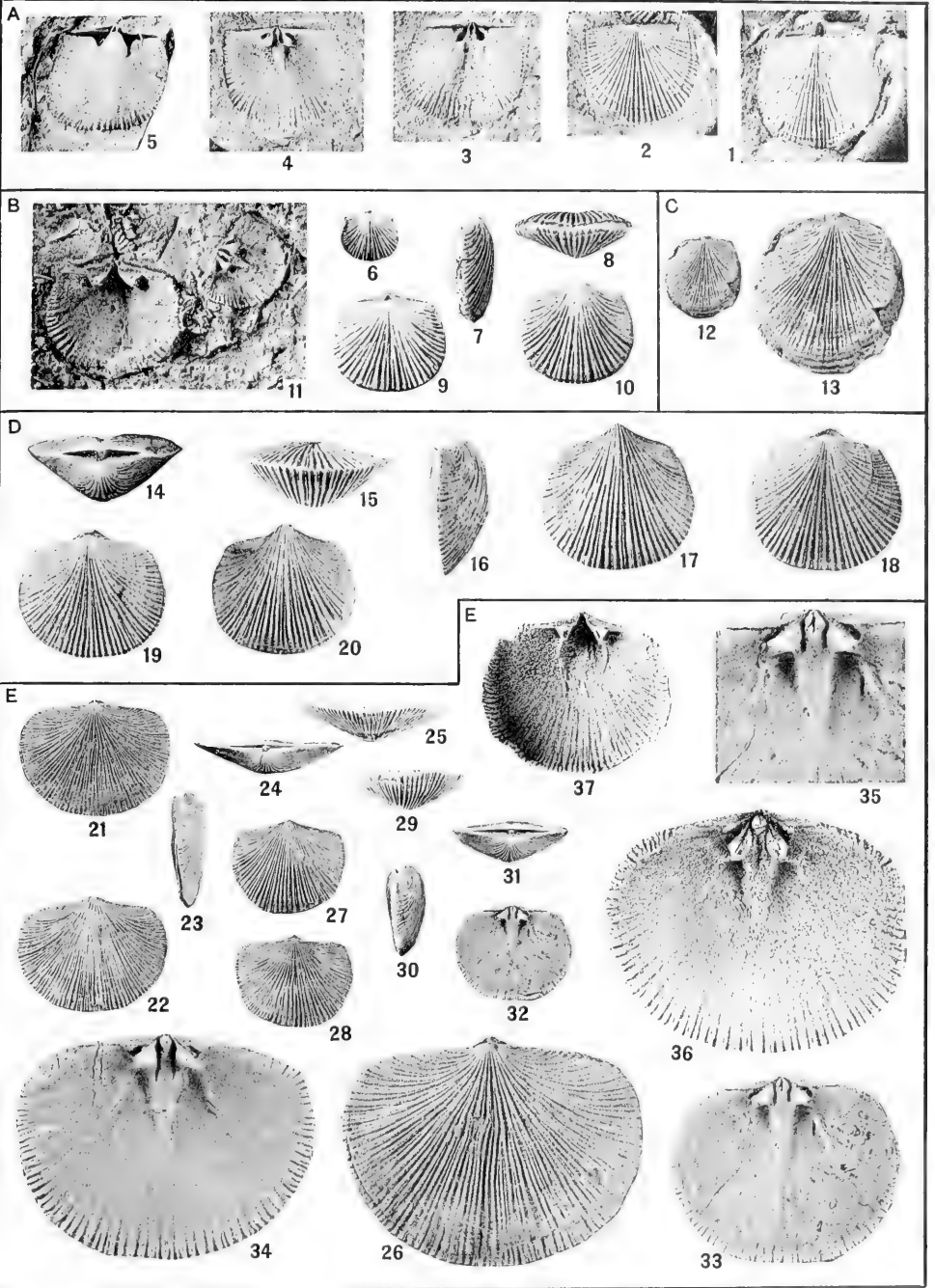




CRISTIFERINA, DALMANELLA, ONNIELLA, PAUCICRURA, PIONODEMA  
(SEE EXPLANATION OF PLATES.)

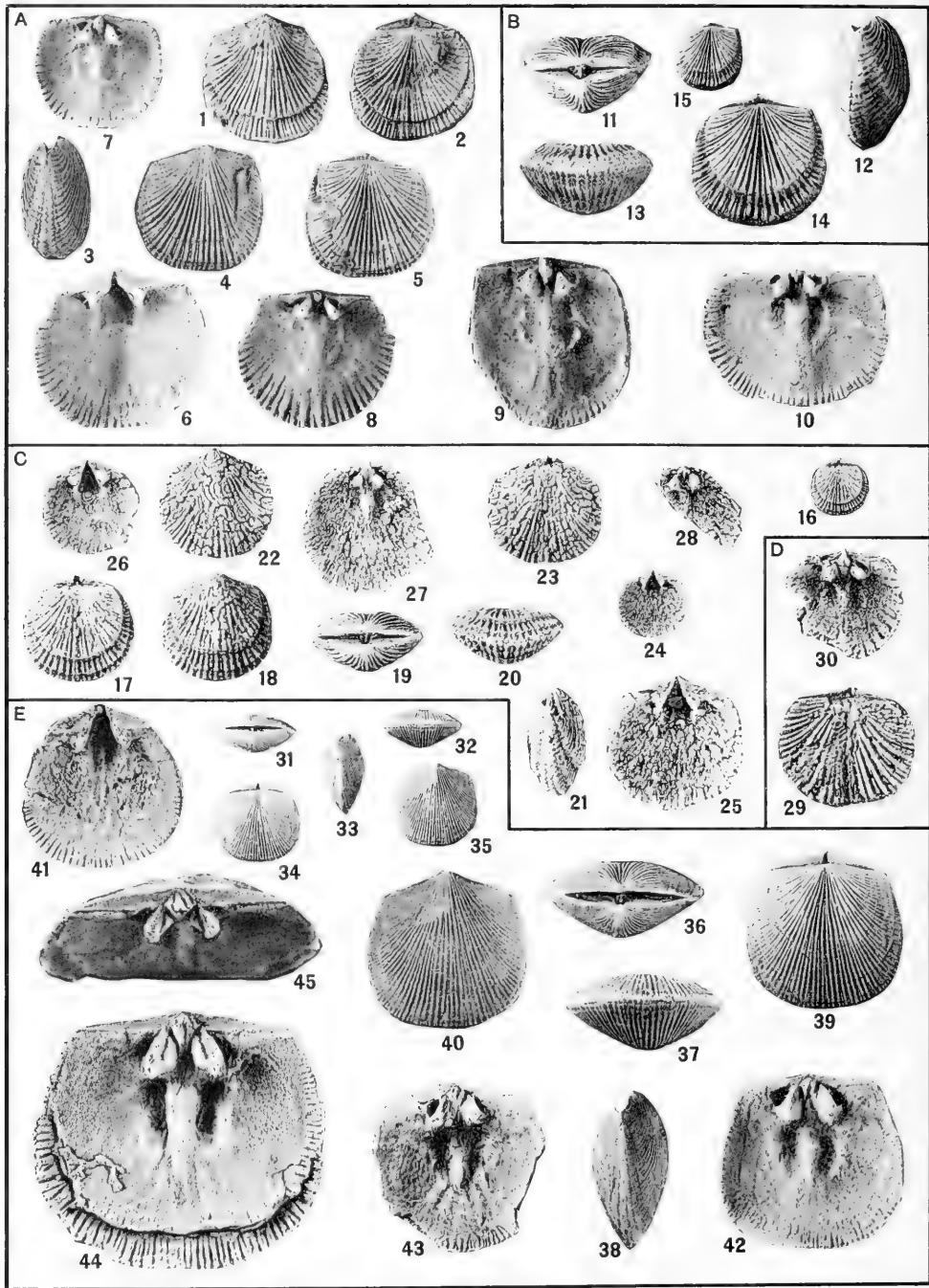


CRISTIFERINA, DALMANELLA  
 (SEE EXPLANATION OF PLATES.)

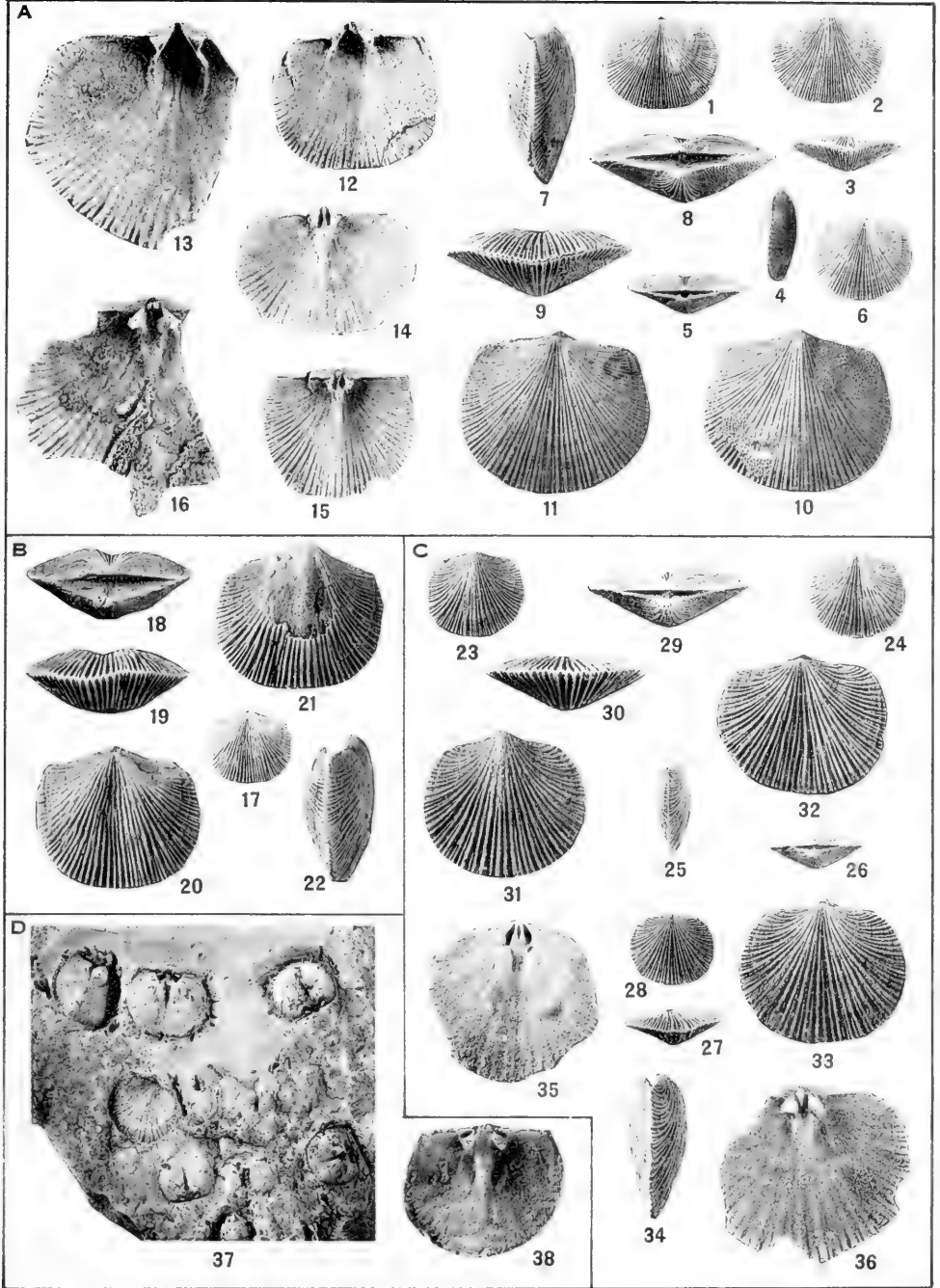


CRUSTIFERINA, ONNIELLA, PAUCICRURA

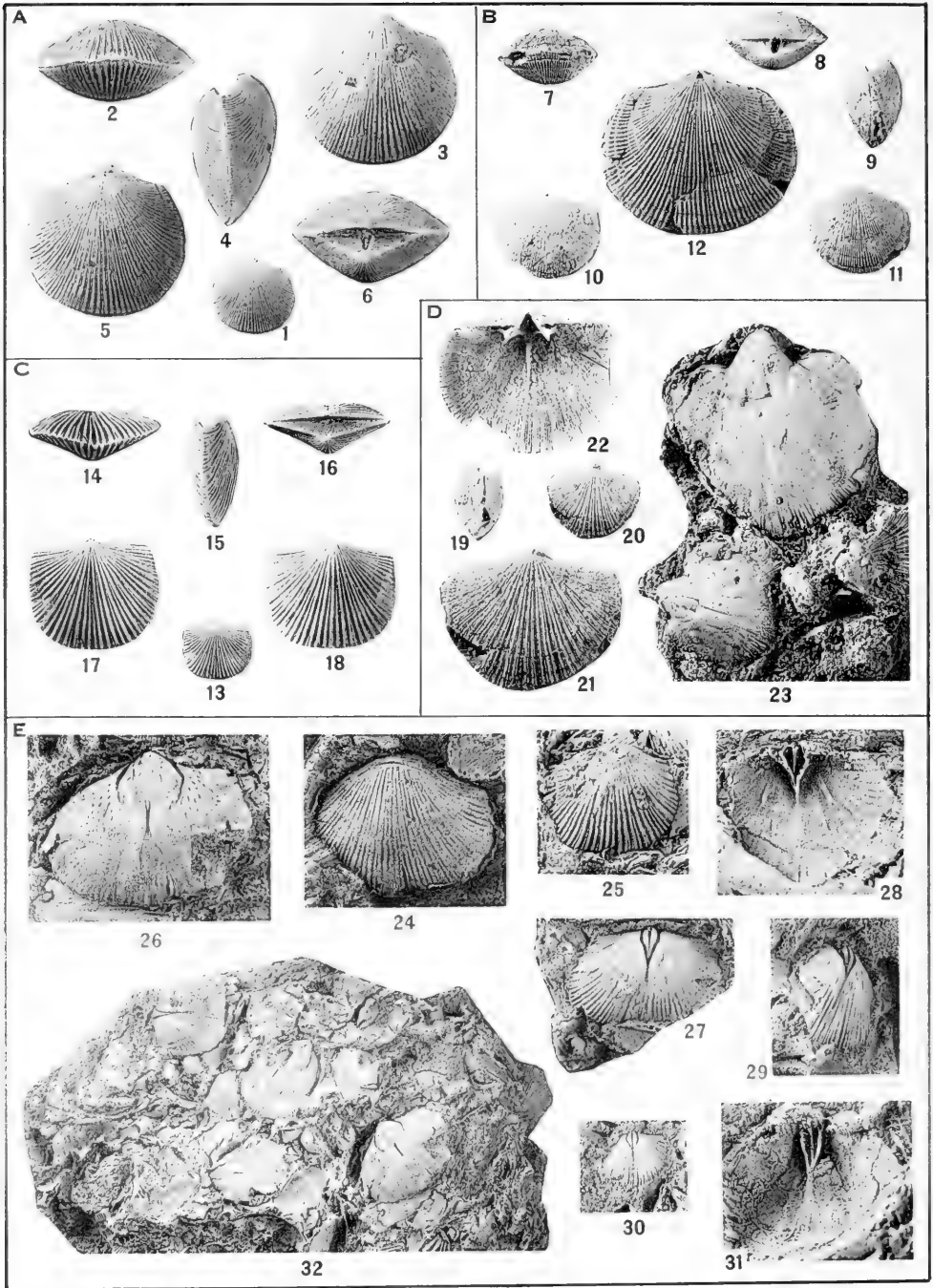
(SEE EXPLANATION OF PLATES.)



CRISTIFERINA, EREMOTREMA, PAUCICRURA  
(SEE EXPLANATION OF PLATES.)

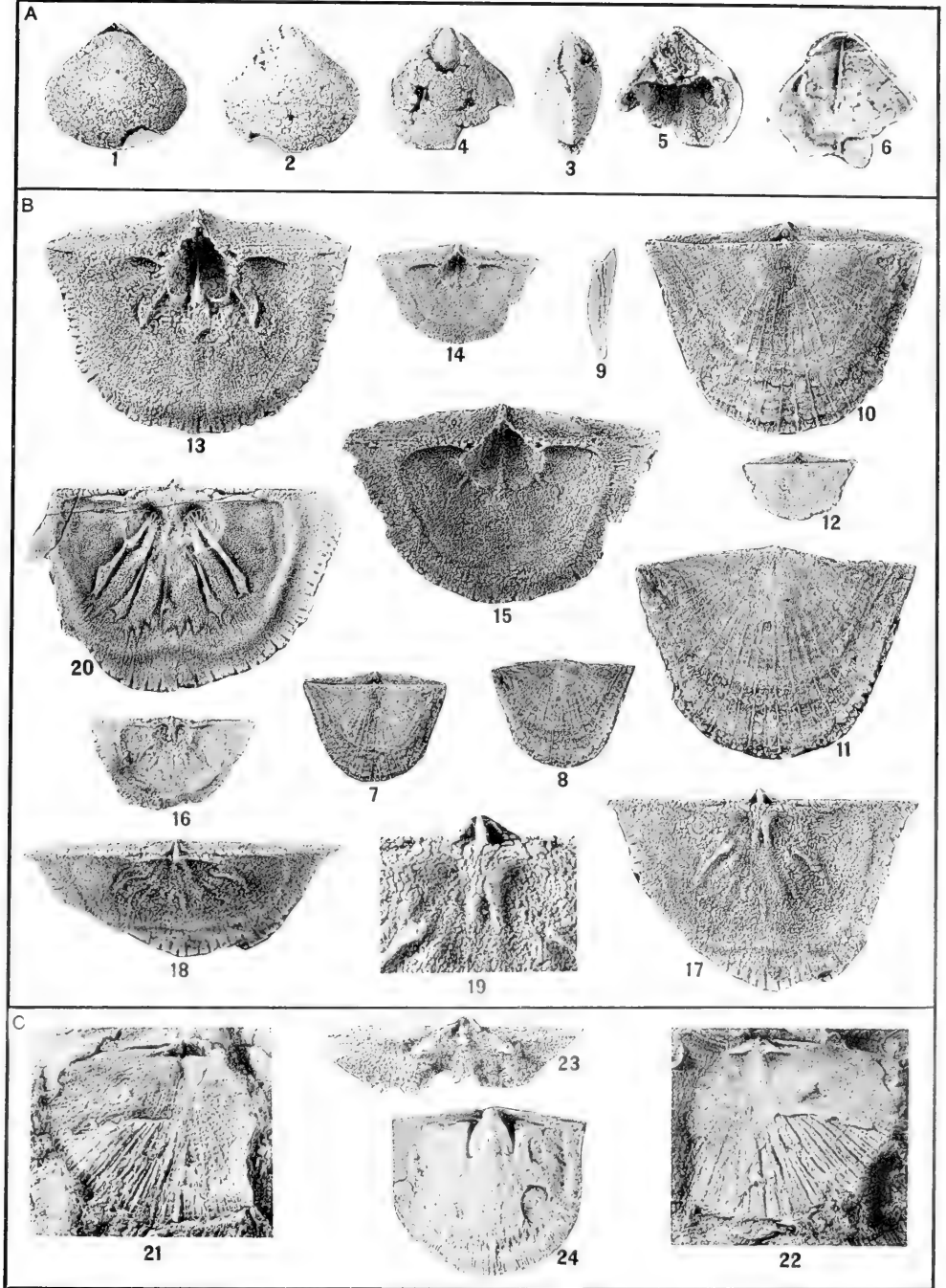


CRISTIFERINA, DALMANELLA, ONNIELLA  
(SEE EXPLANATION OF PLATES.)



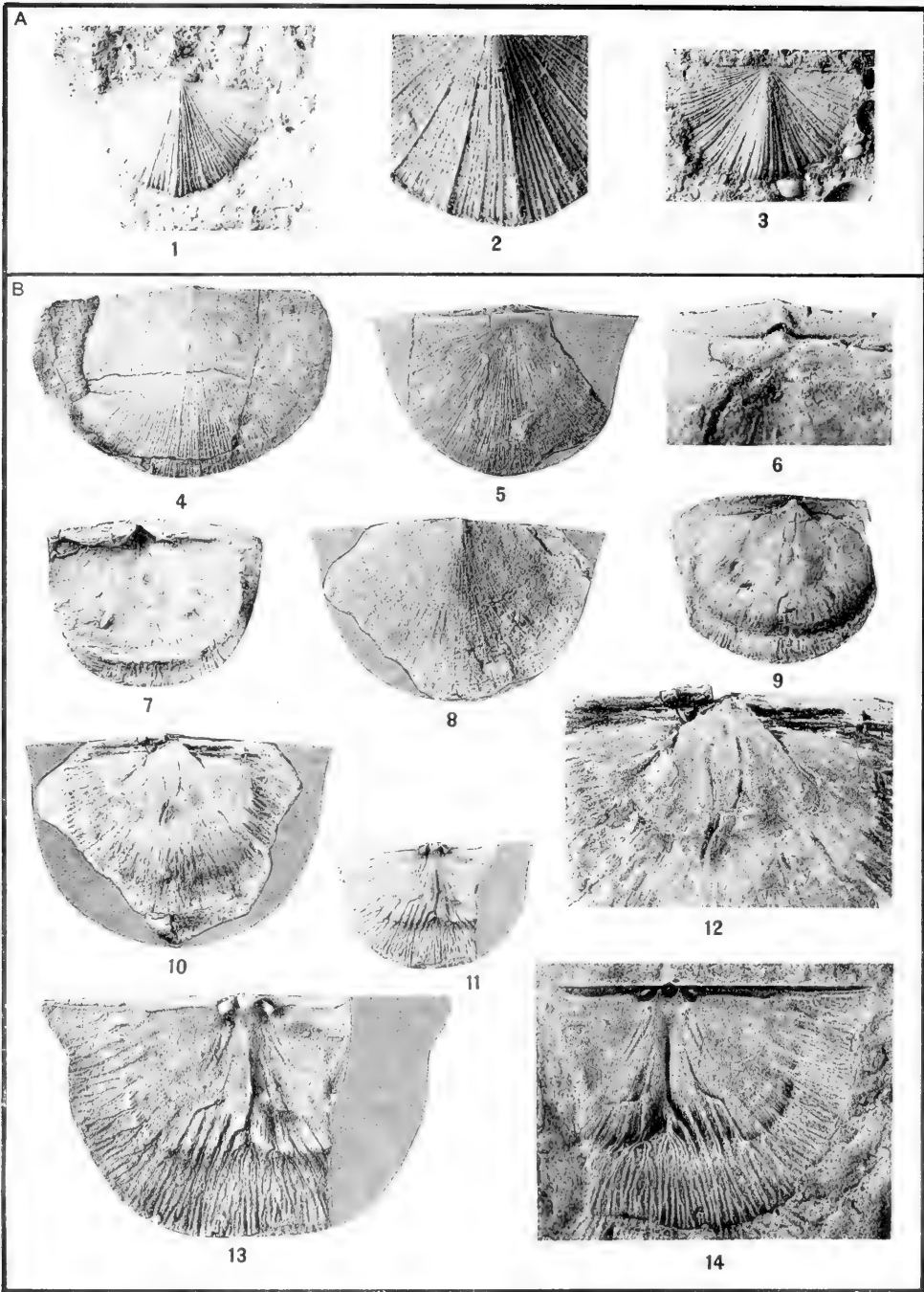
DALMANELLA, PAURORTHIS, PIONODEMA

(SEE EXPLANATION OF PLATES.)



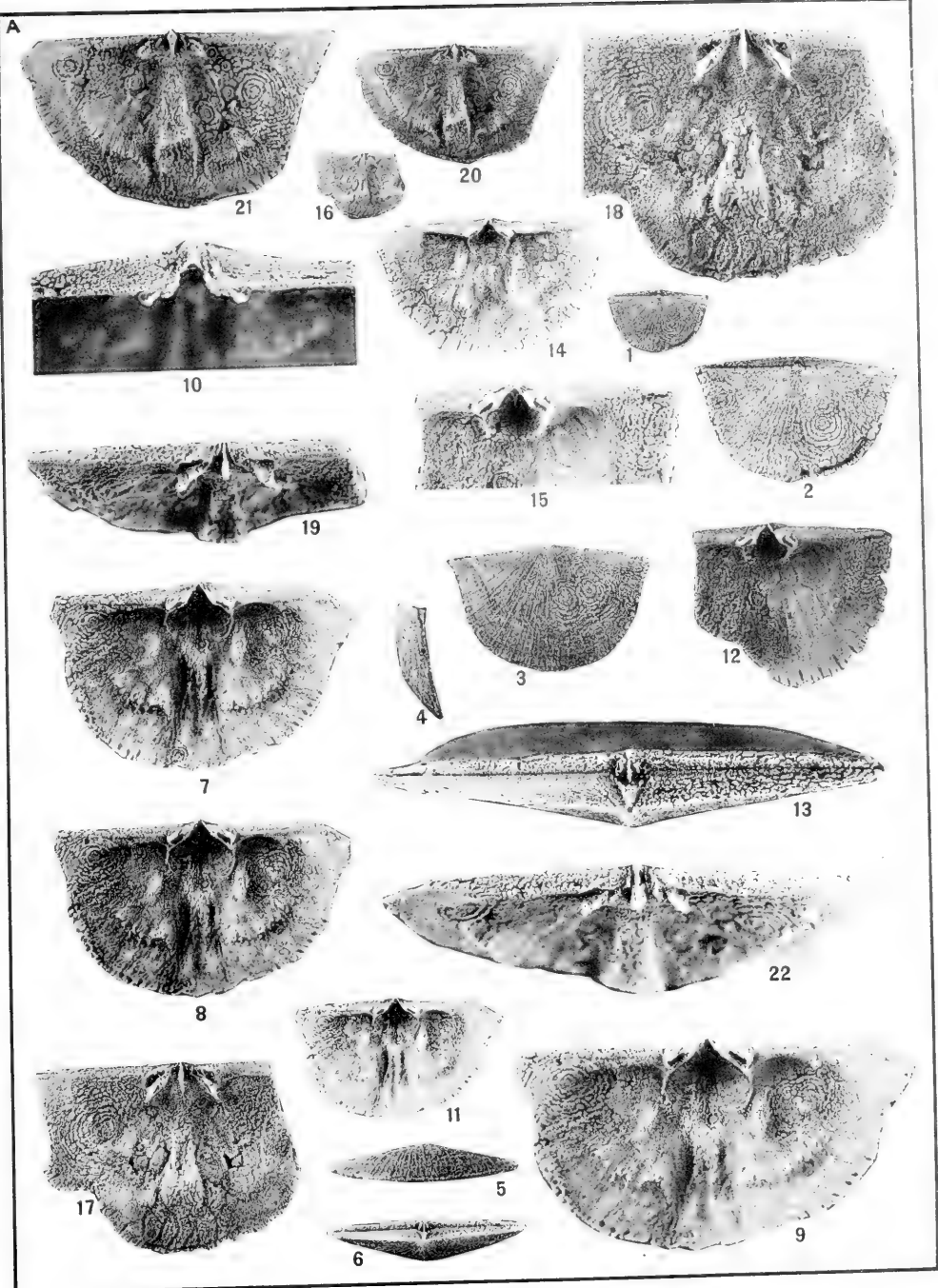
APORTHOPHYLA, EICHWALDIA, INGRIA

(SEE EXPLANATION OF PLATES.)



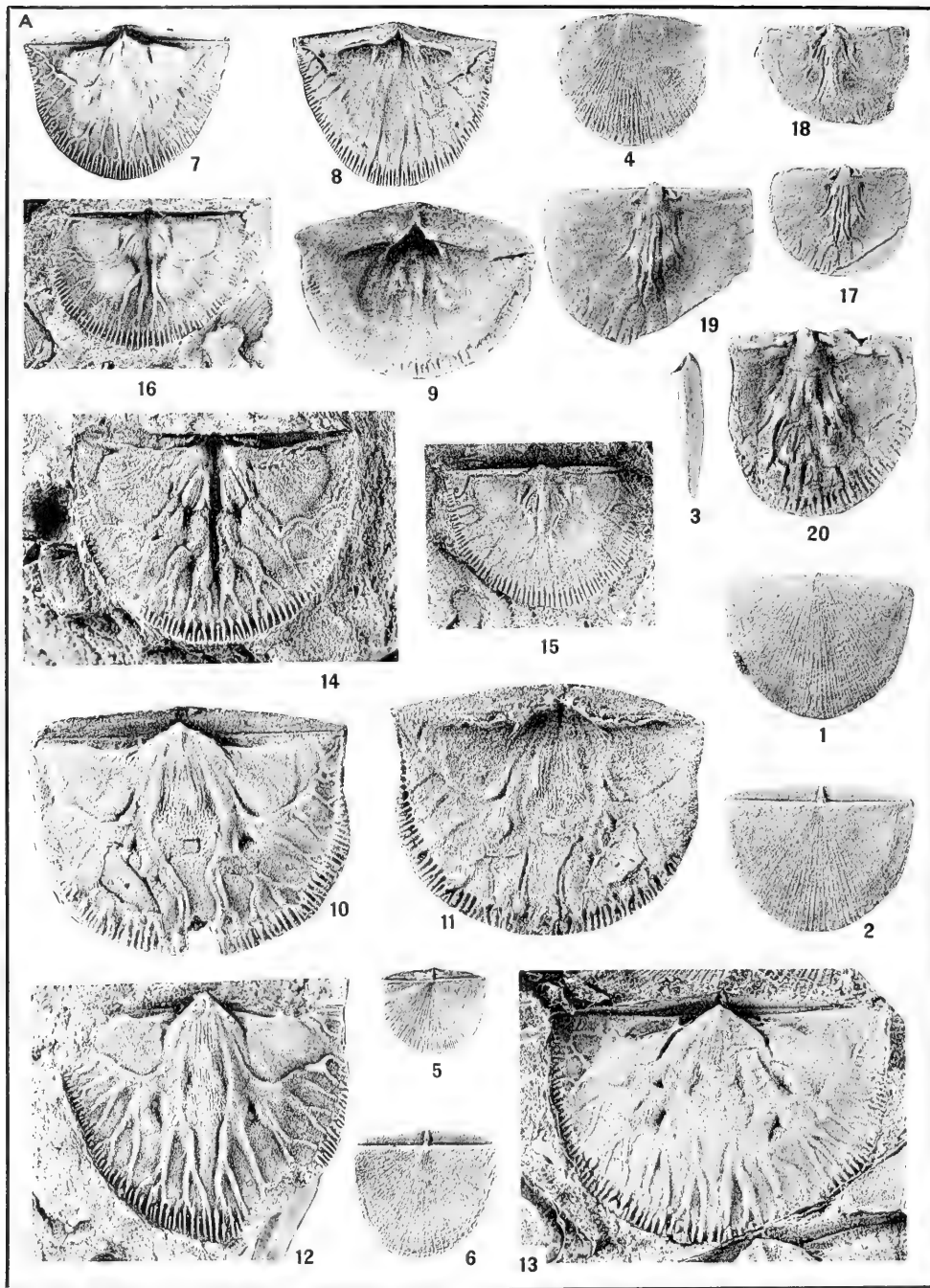
APORTHOPHYLA, TOQUIMIA  
(SEE EXPLANATION OF PLATES.)





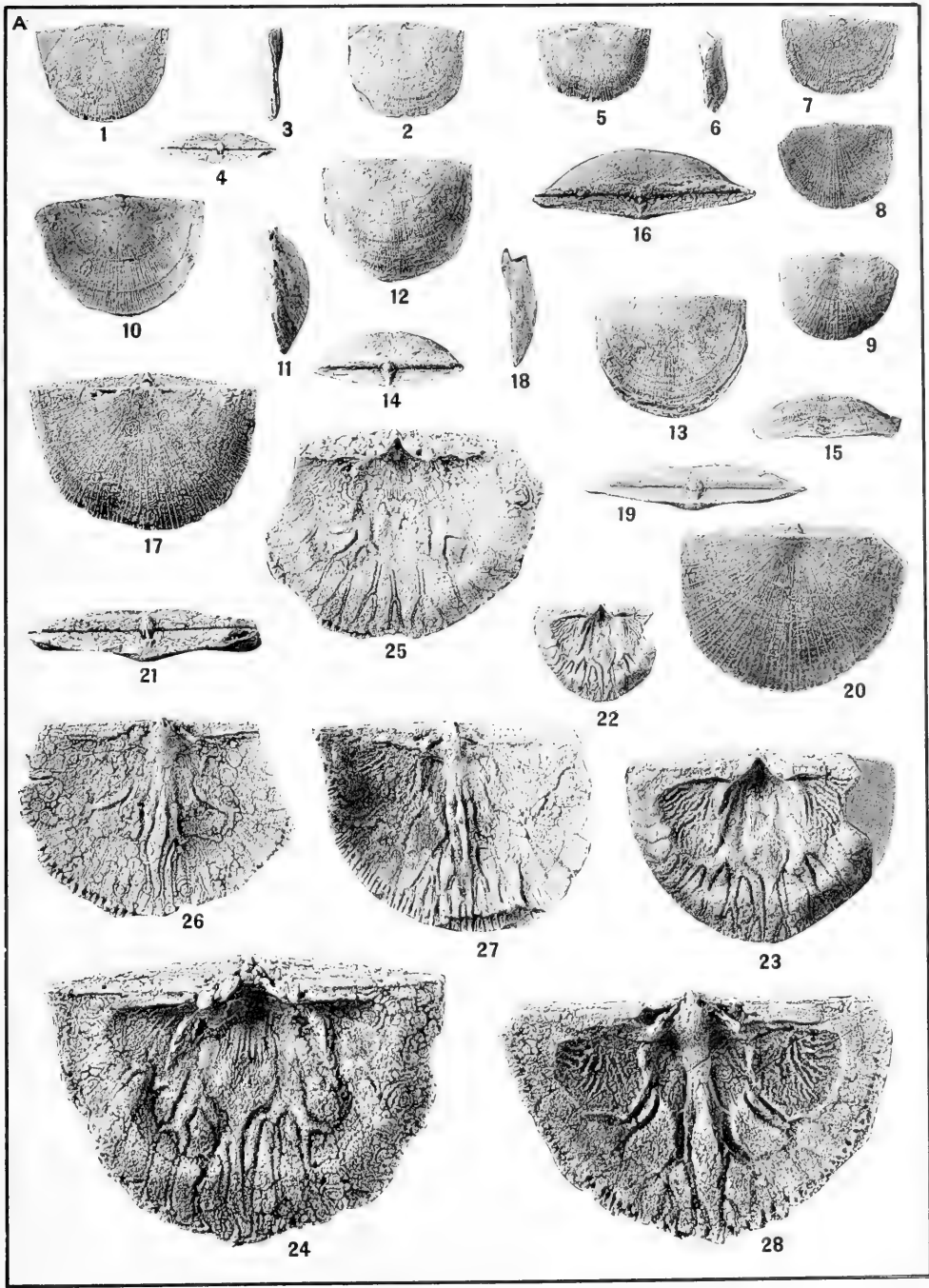
TAPHRODONTA

(SEE EXPLANATION OF PLATES.)

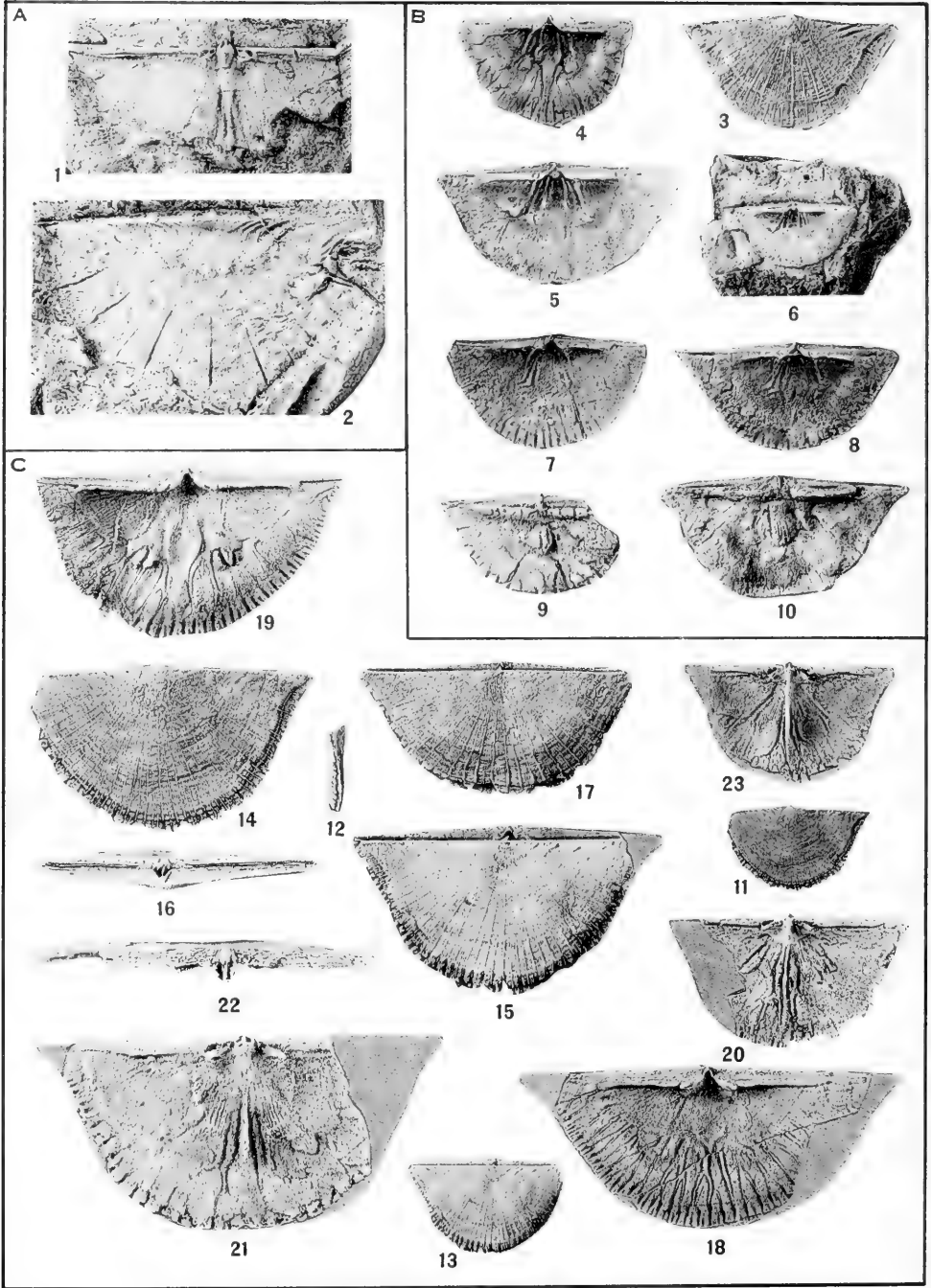


APATOMORPHA

(SEE EXPLANATION OF PLATES.)

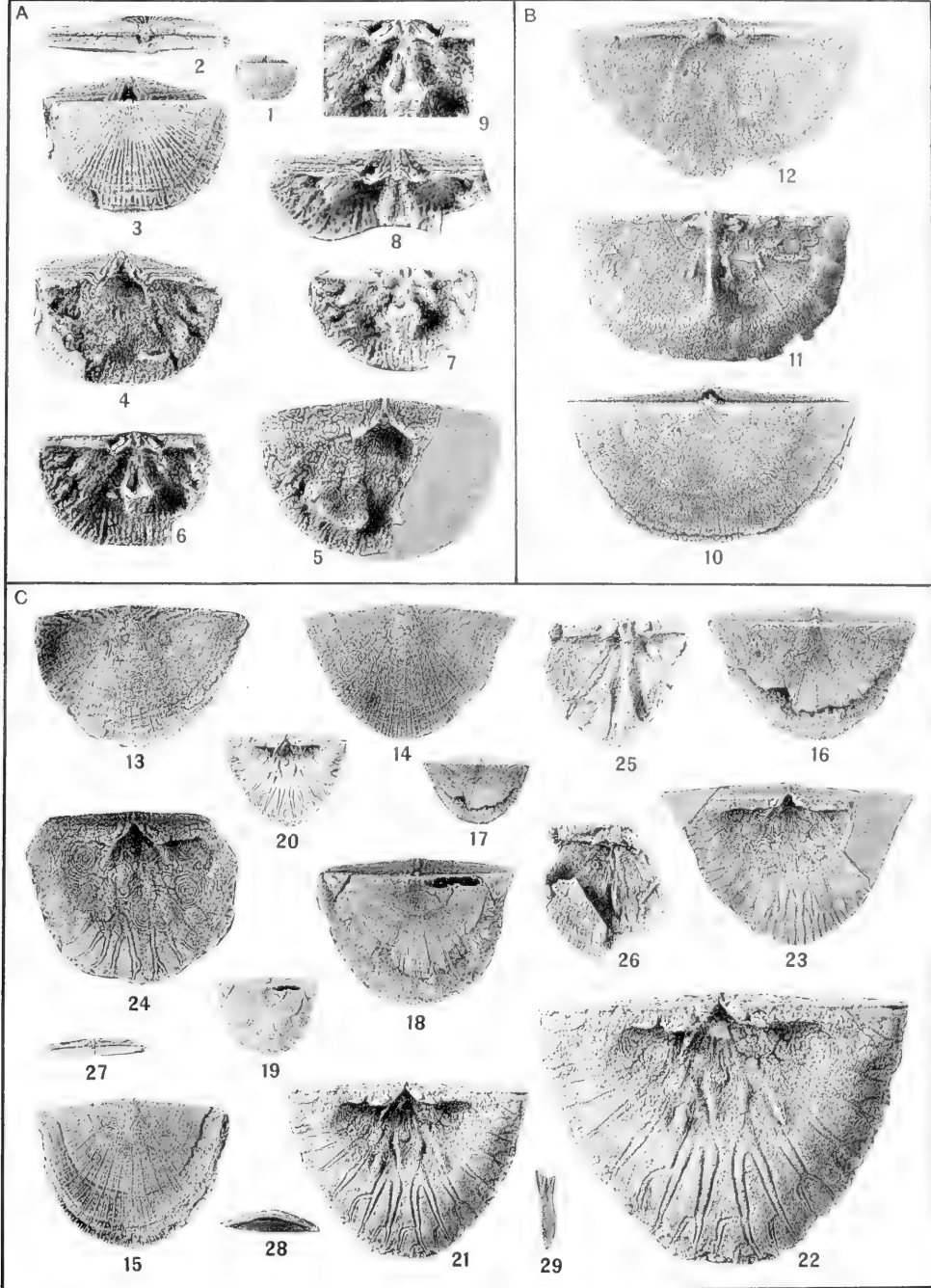


PALAEOSTROPHOMENA  
(SEE EXPLANATION OF PLATES.)

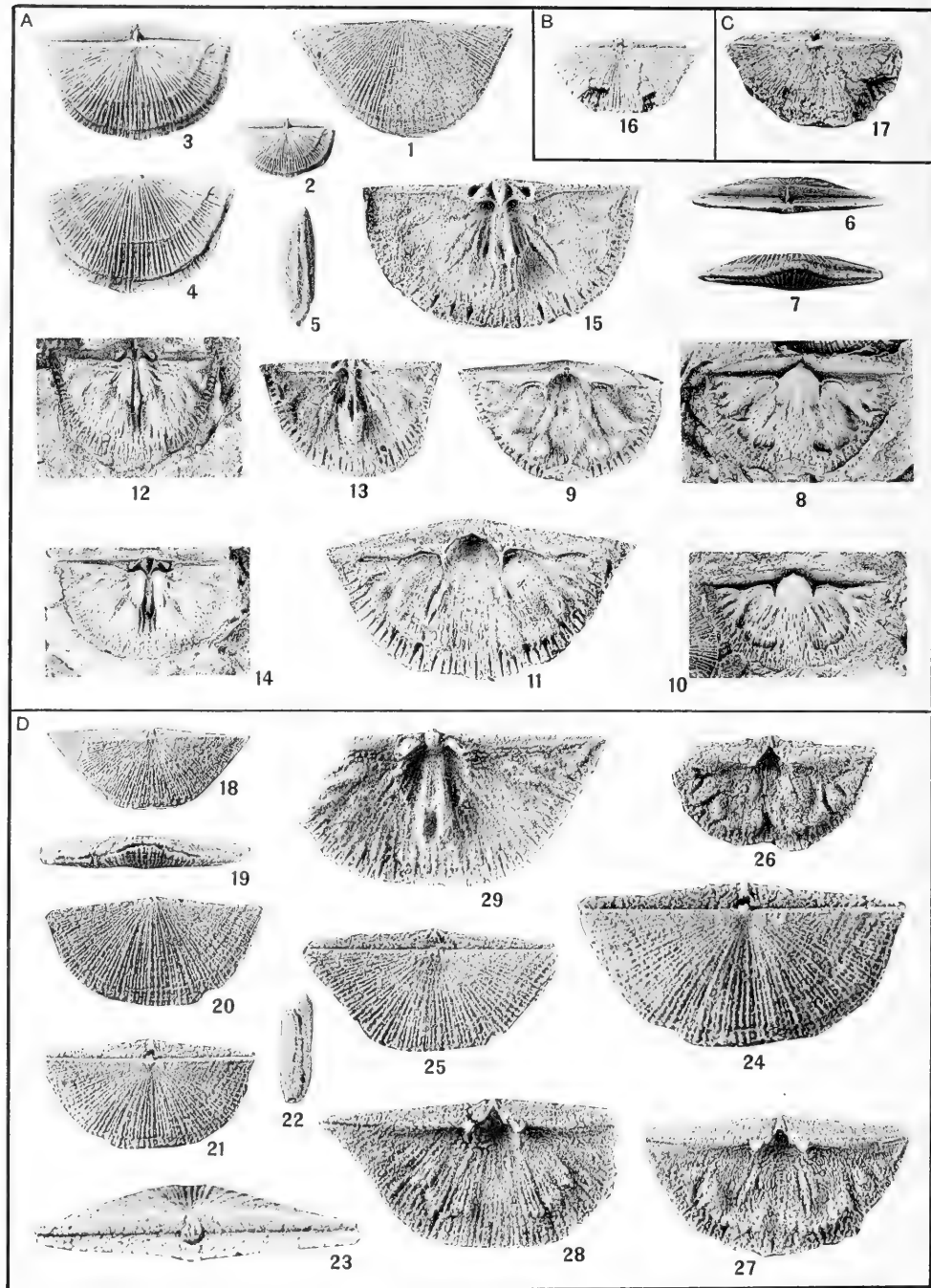


GLYPTAMBONITES, PALAEOSTROPHOMENA

(SEE EXPLANATION OF PLATES.)

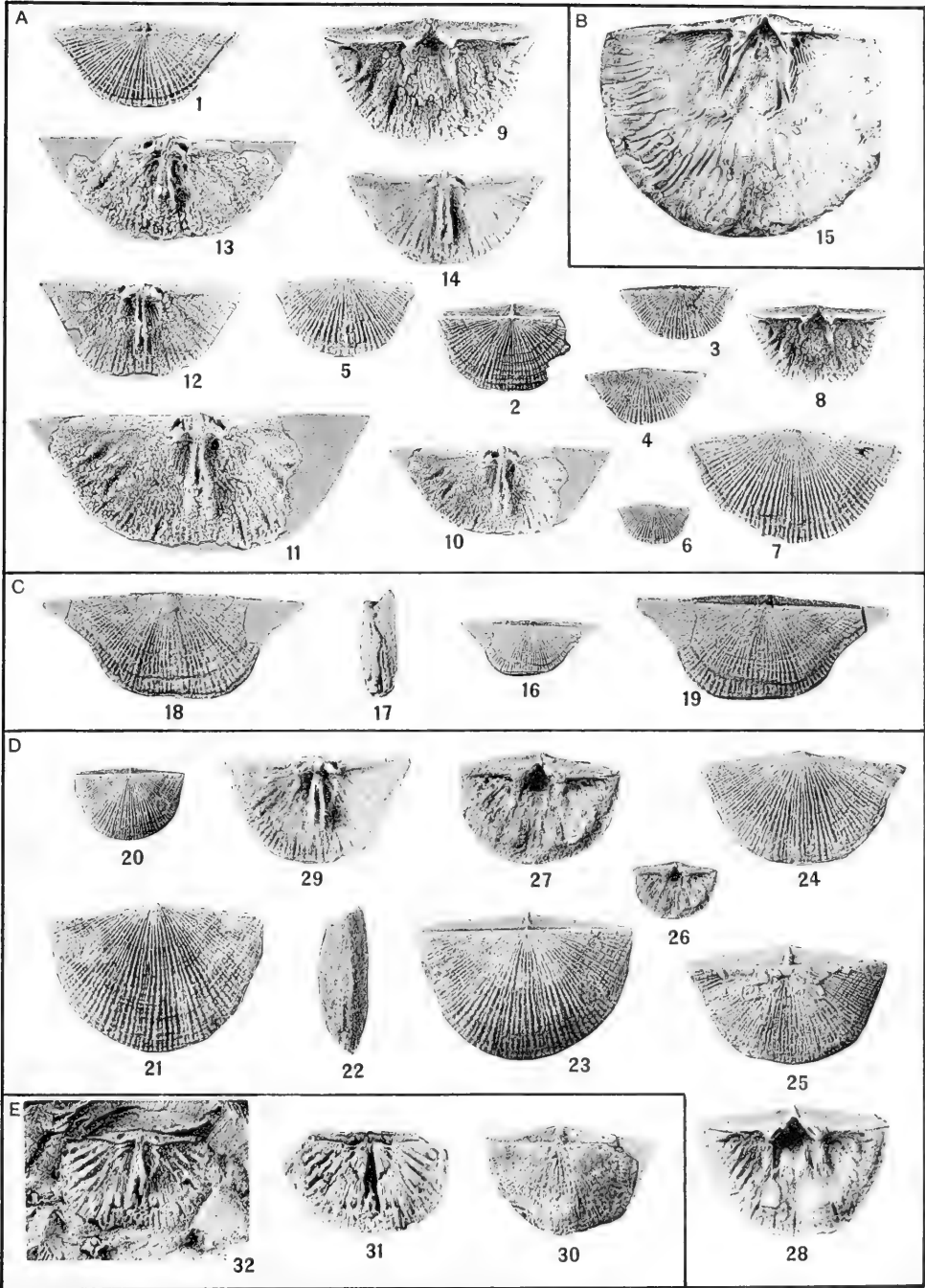


ISOPHRAGMA, PALAEOSTROPHOMENA, SOWERBYITES  
(SEE EXPLANATION OF PLATES.)

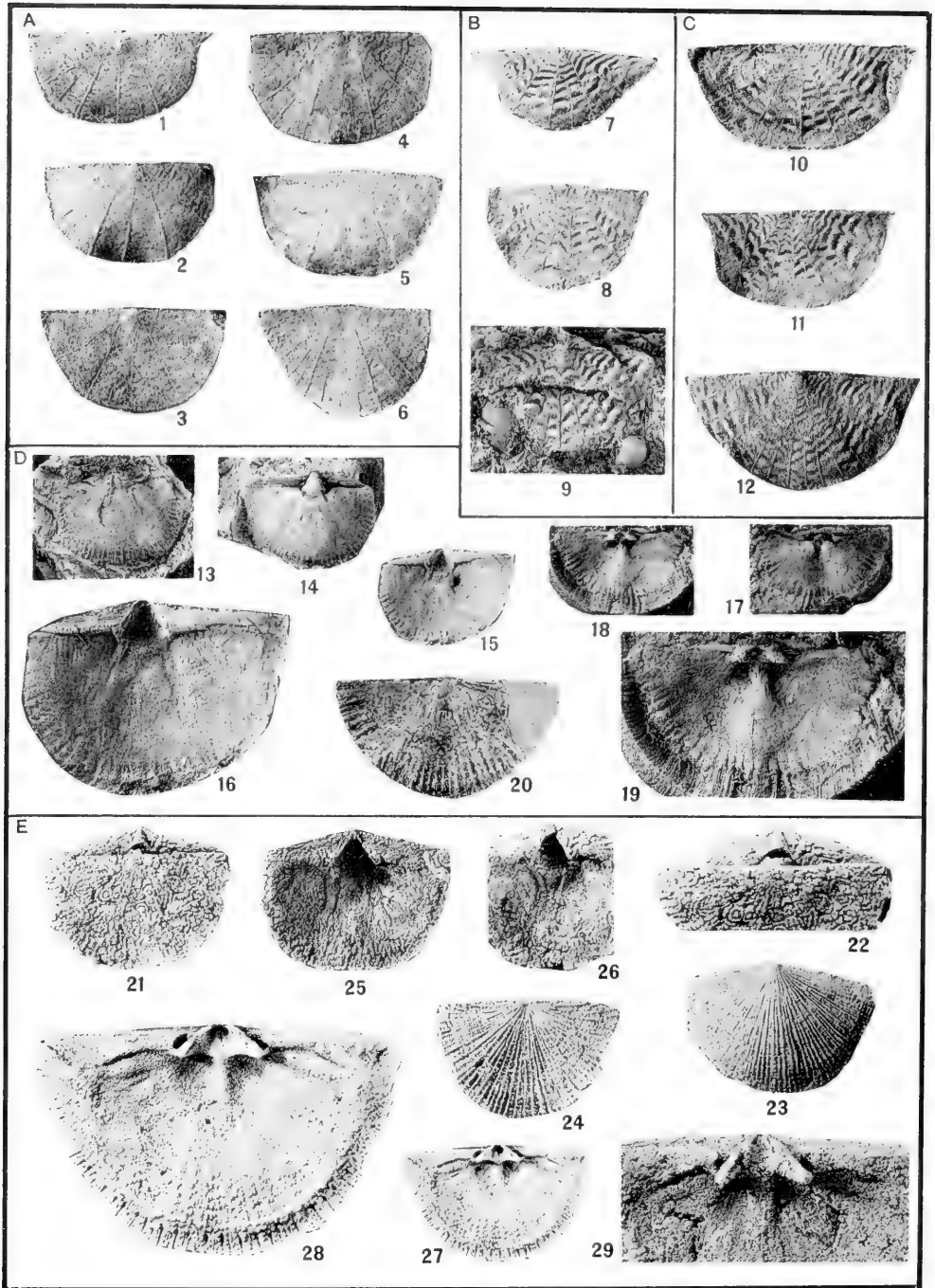


ISOPHRAGMA

(SEE EXPLANATION OF PLATES.)



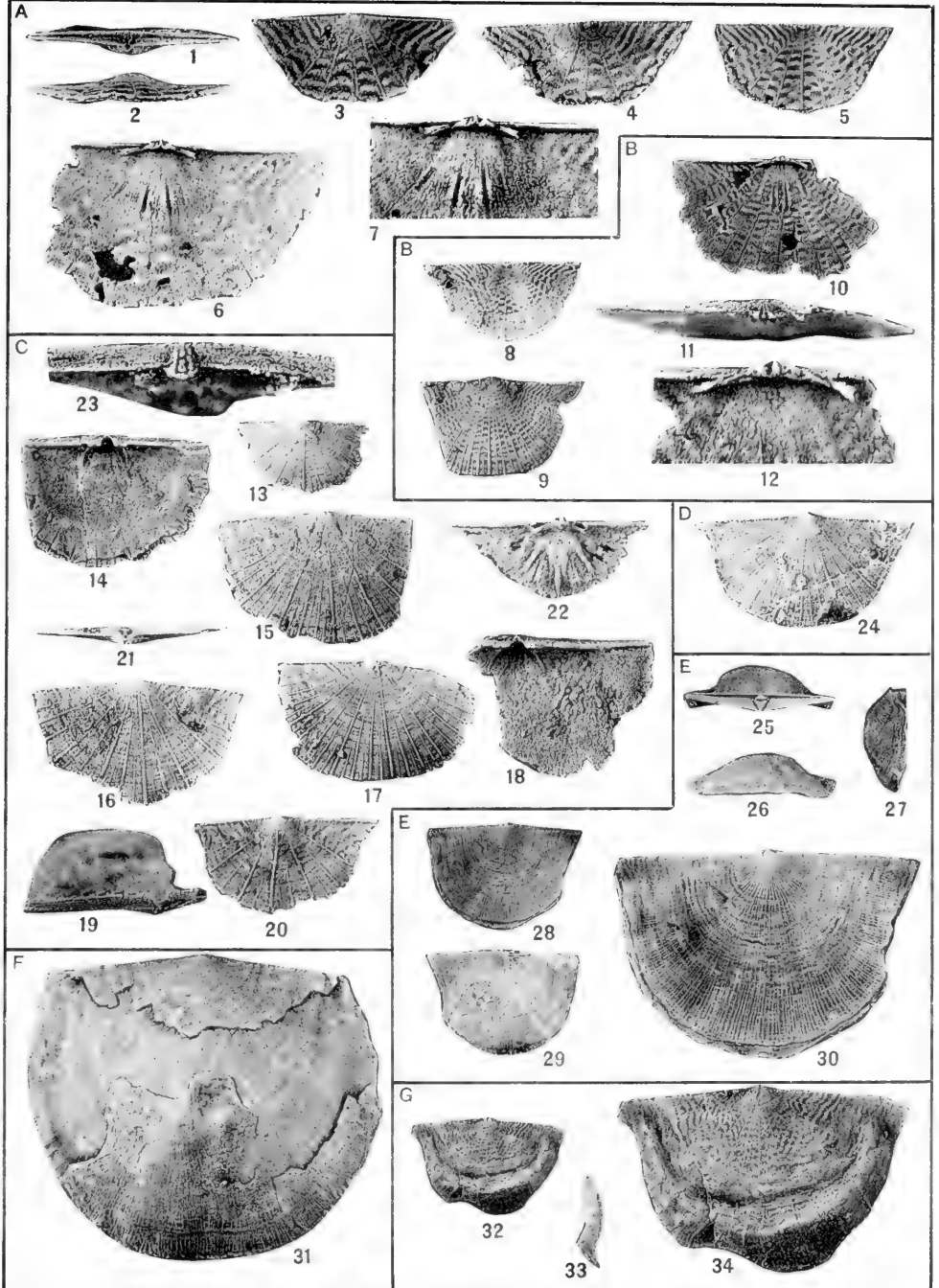
GLYPTAMBONITES, ISOPHRAGMA  
 (SEE EXPLANATION OF PLATES.)



HESPERONOMIELLA, PAUCICOSTELLA, PTYCHOGLYPTUS, TAFFIA

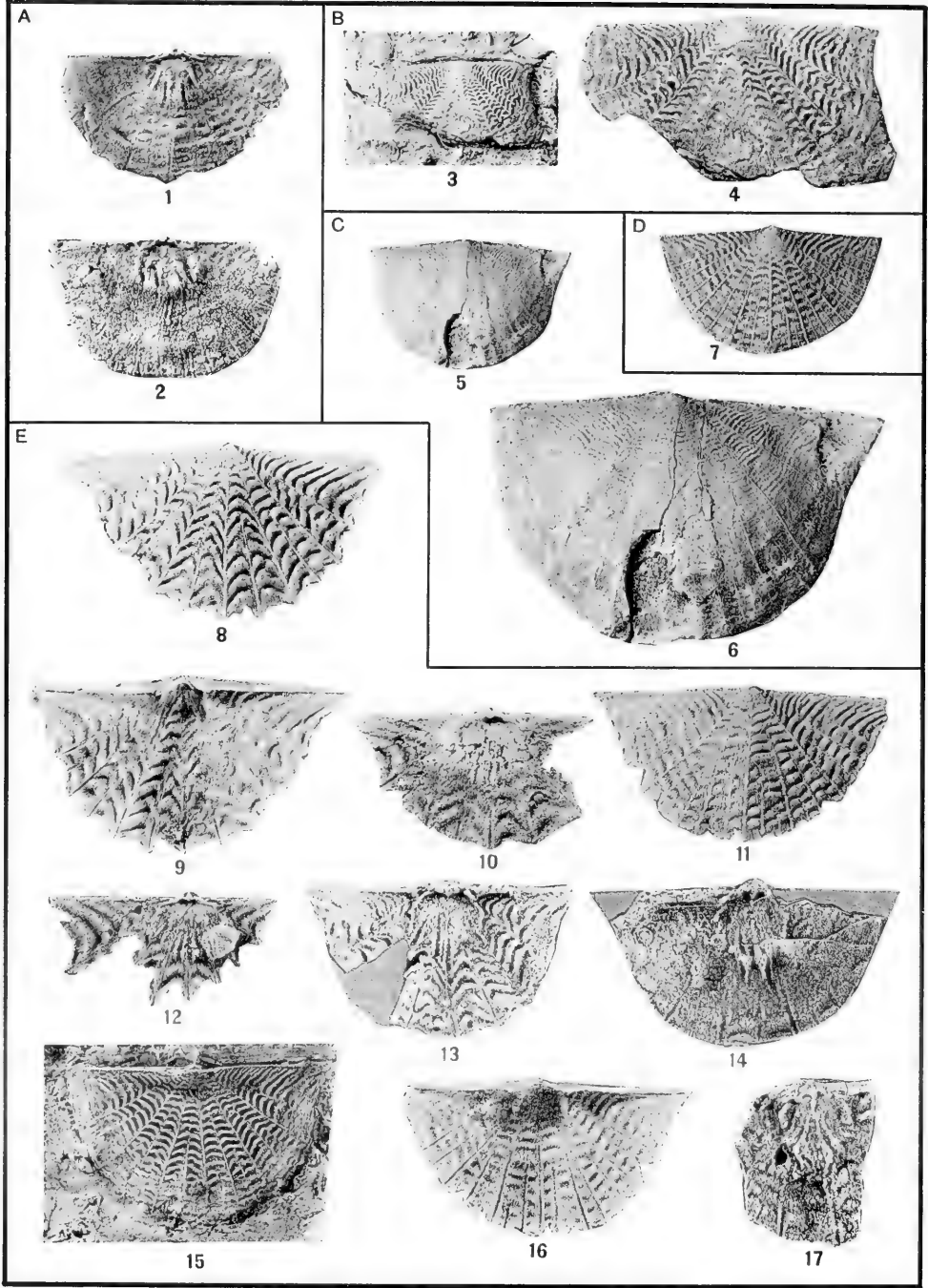
(SEE EXPLANATION OF PLATES.)





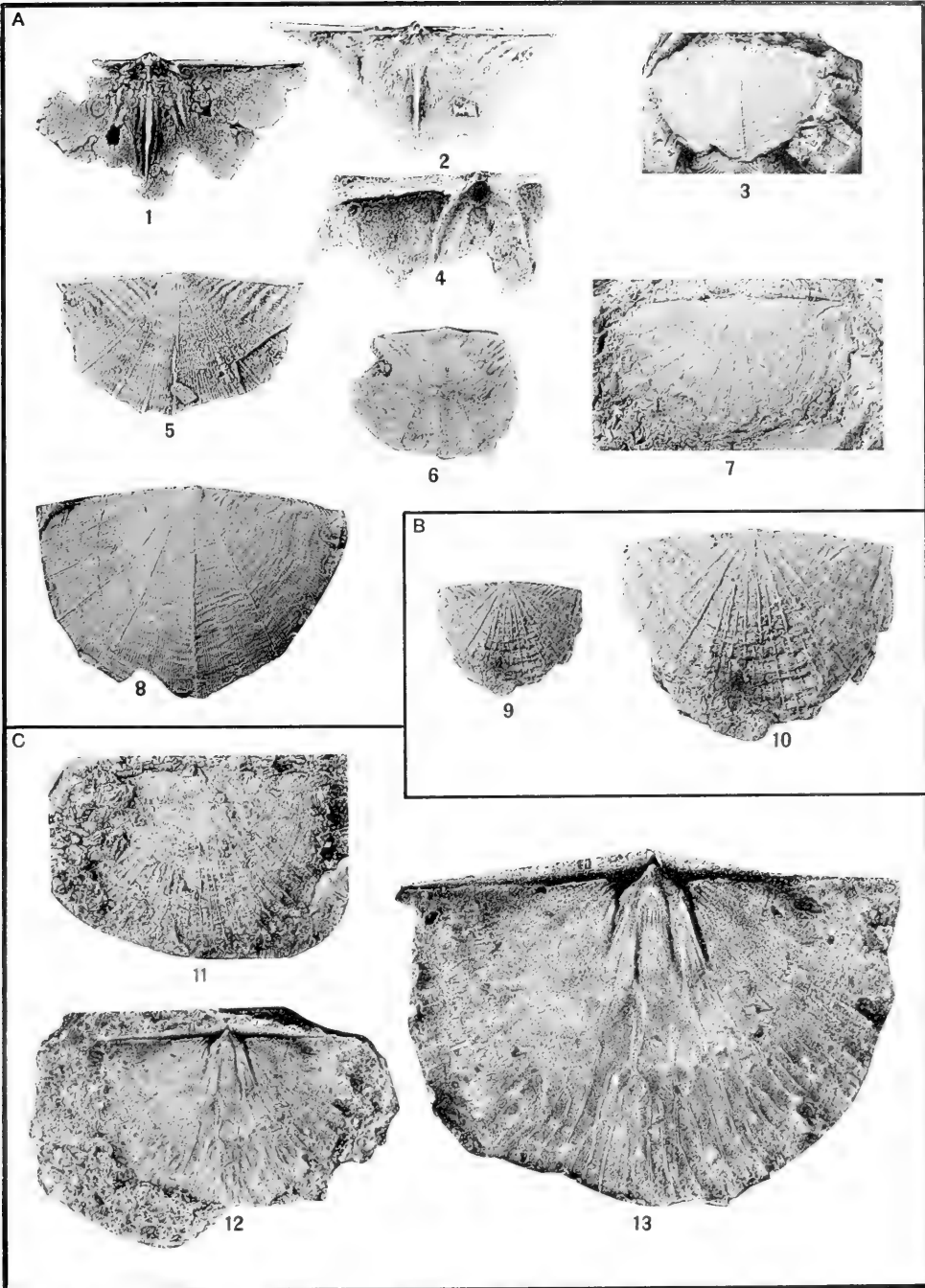
GLYPTAMBONITES, LIMBIMURINA, MACROCOELIA, PAUCICOSTELLA,  
PTYCHOGLYPTUS, STROPHOMENA

(SEE EXPLANATION OF PLATES.)

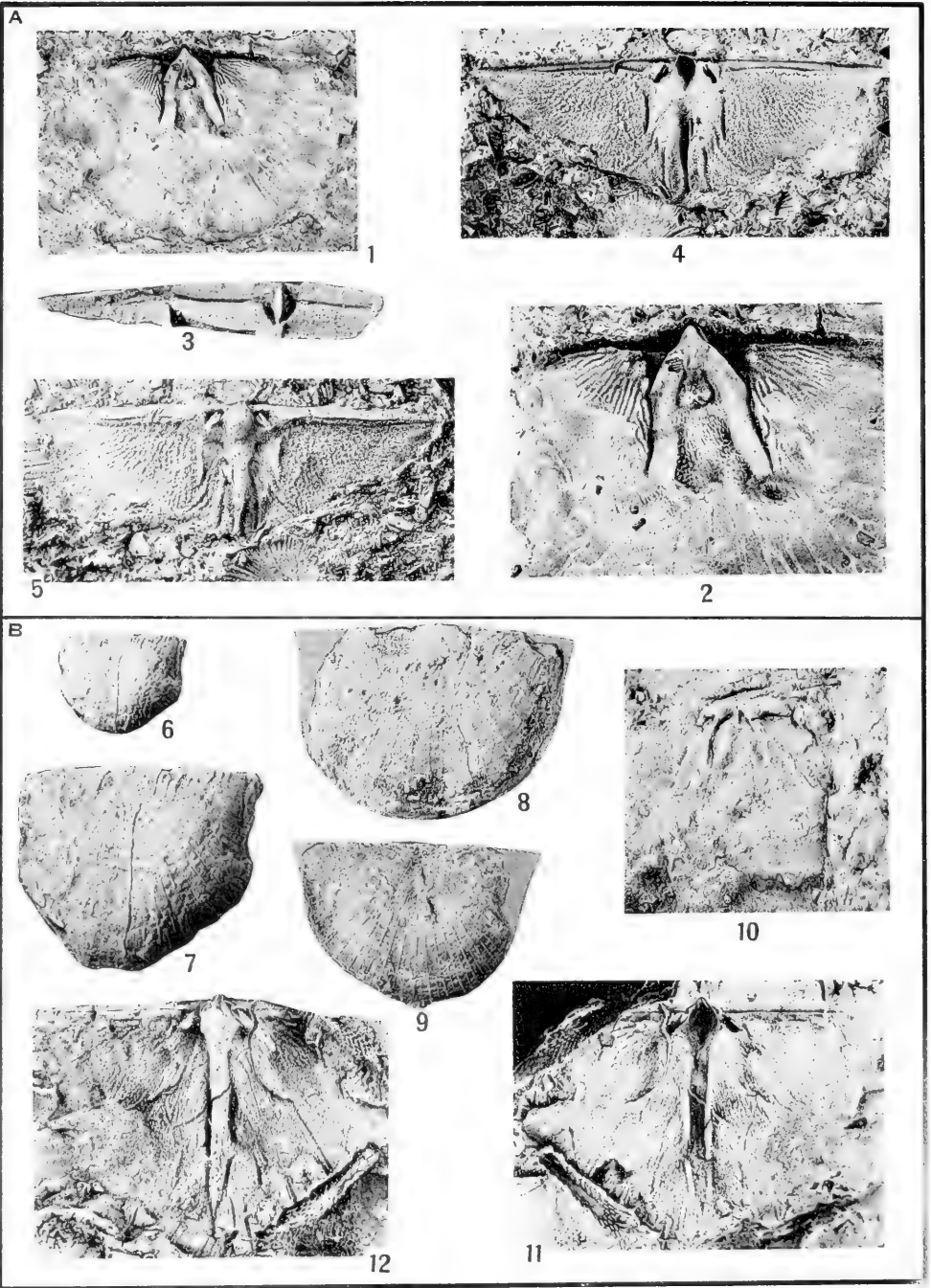


PTYCHOGLYPTUS

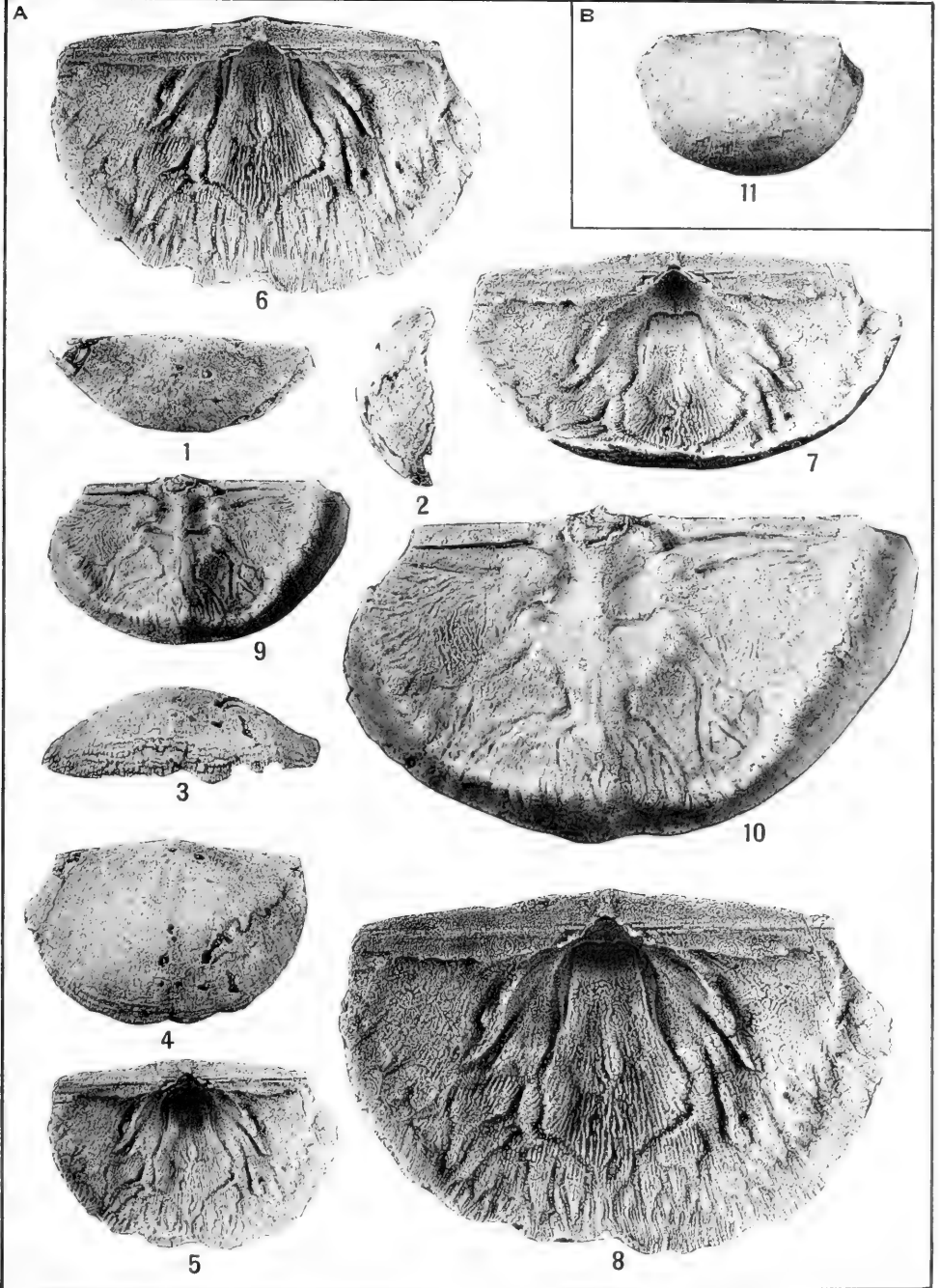
(SEE EXPLANATION OF PLATES.)



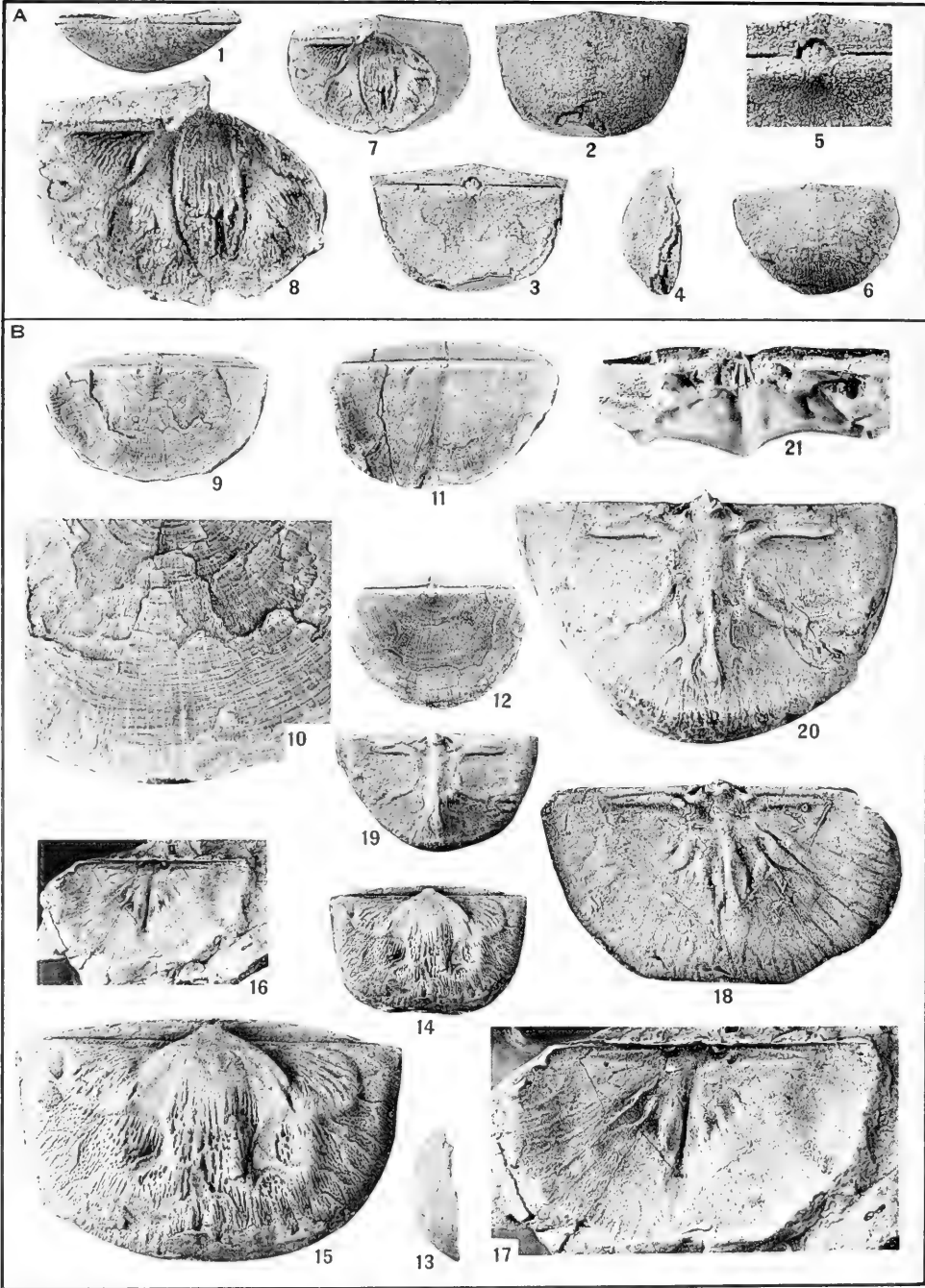
GLYPTAMBONITES  
(SEE EXPLANATION OF PLATES.)



GLYPTAMBONITES, PALAEOSTROPHOMENA  
(SEE EXPLANATION OF PLATES.)

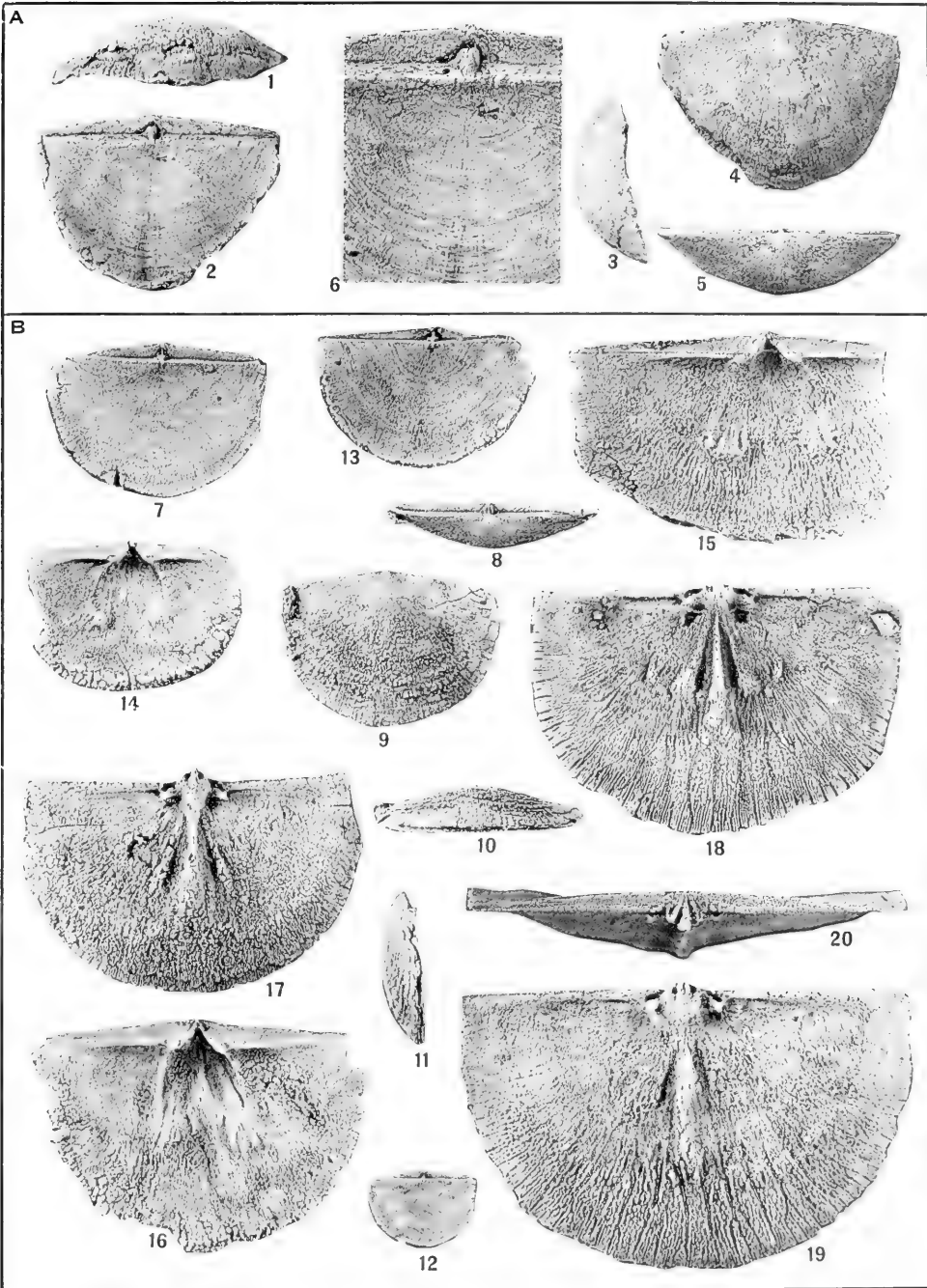


TITANAMBONITES  
(SEE EXPLANATION OF PLATES.)

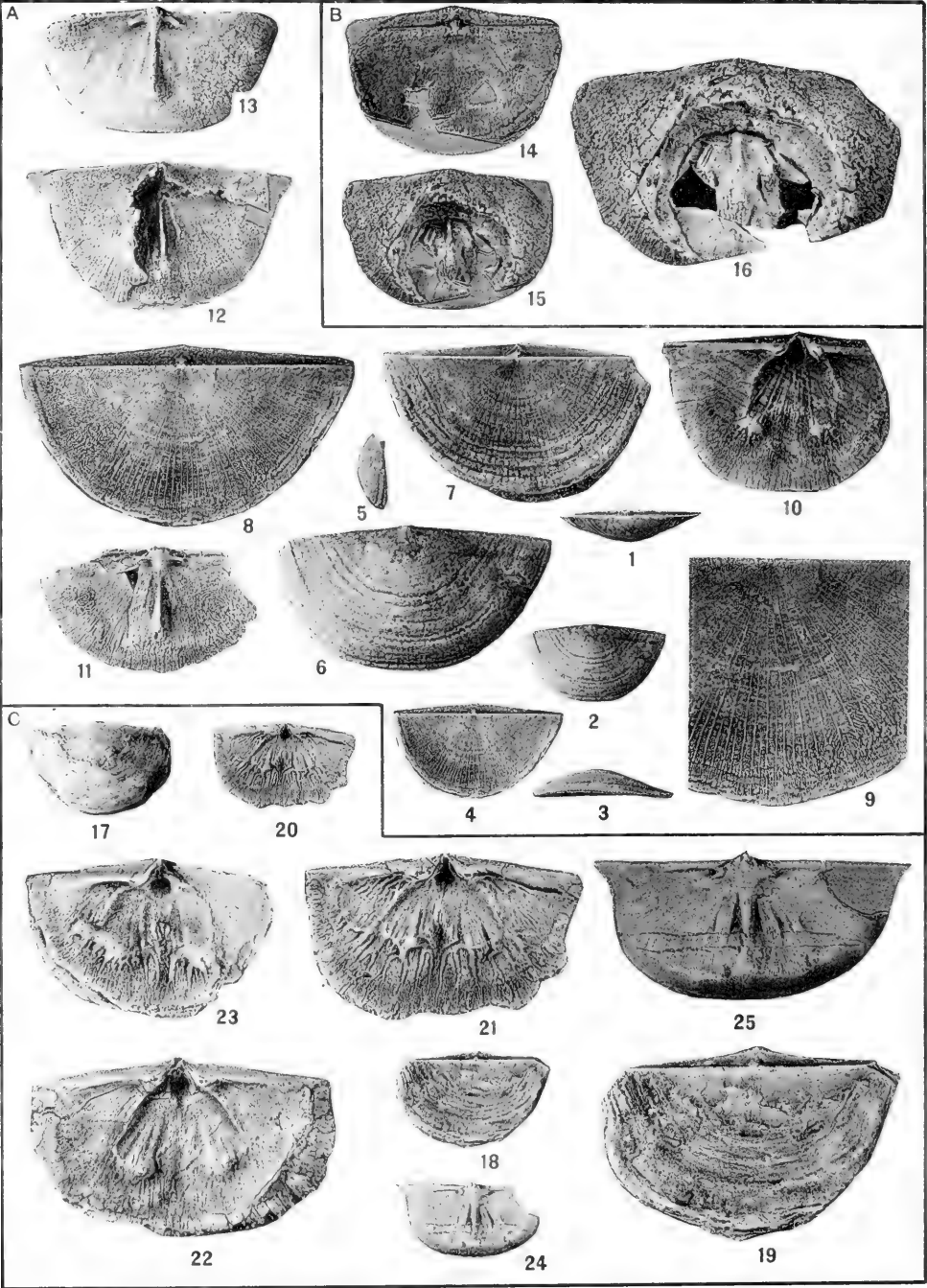


TITANAMBONITES

(SEE EXPLANATION OF PLATES.)

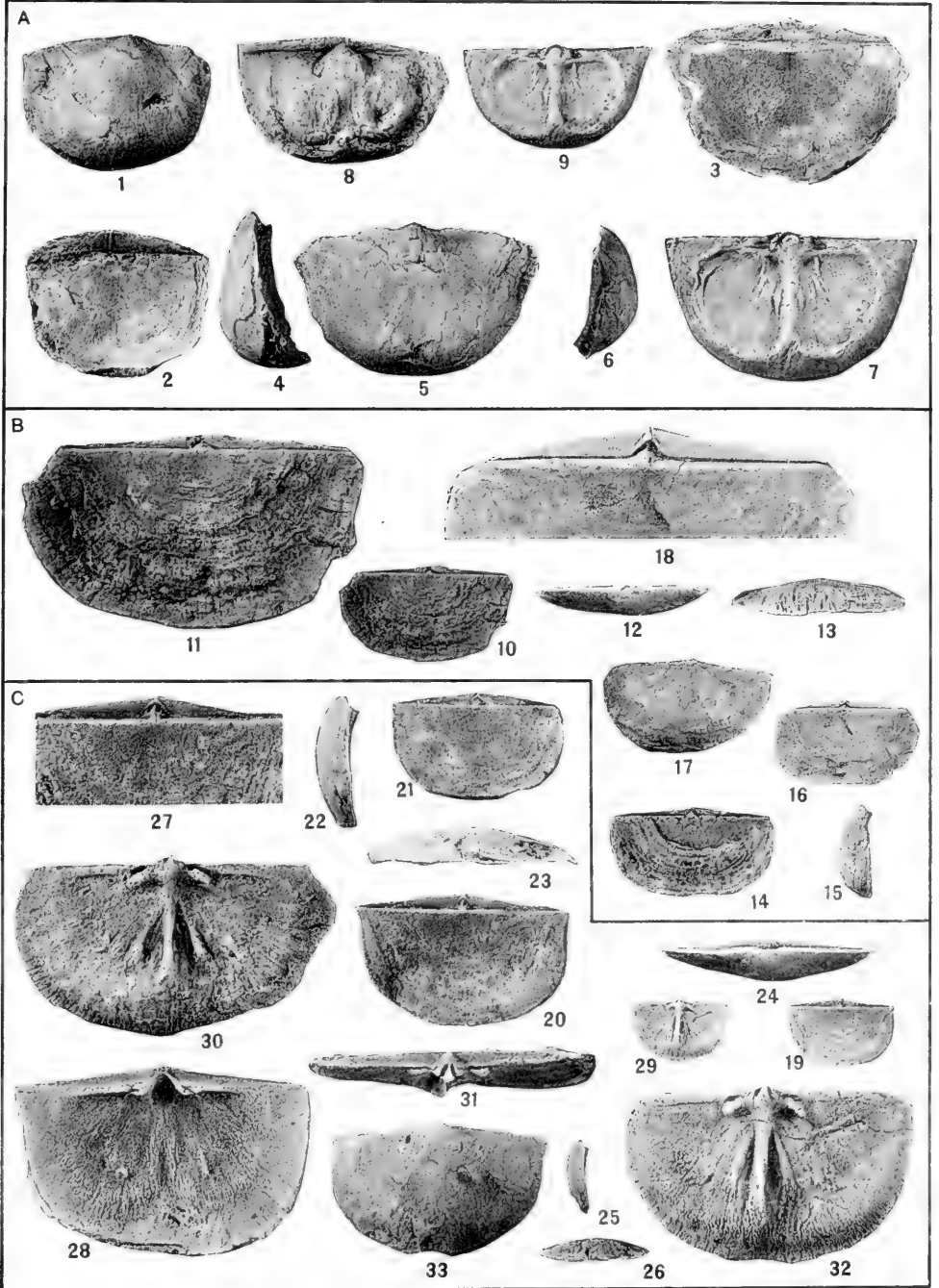


SOWERBYITES, TITANAMBONITES  
(SEE EXPLANATION OF PLATES.)

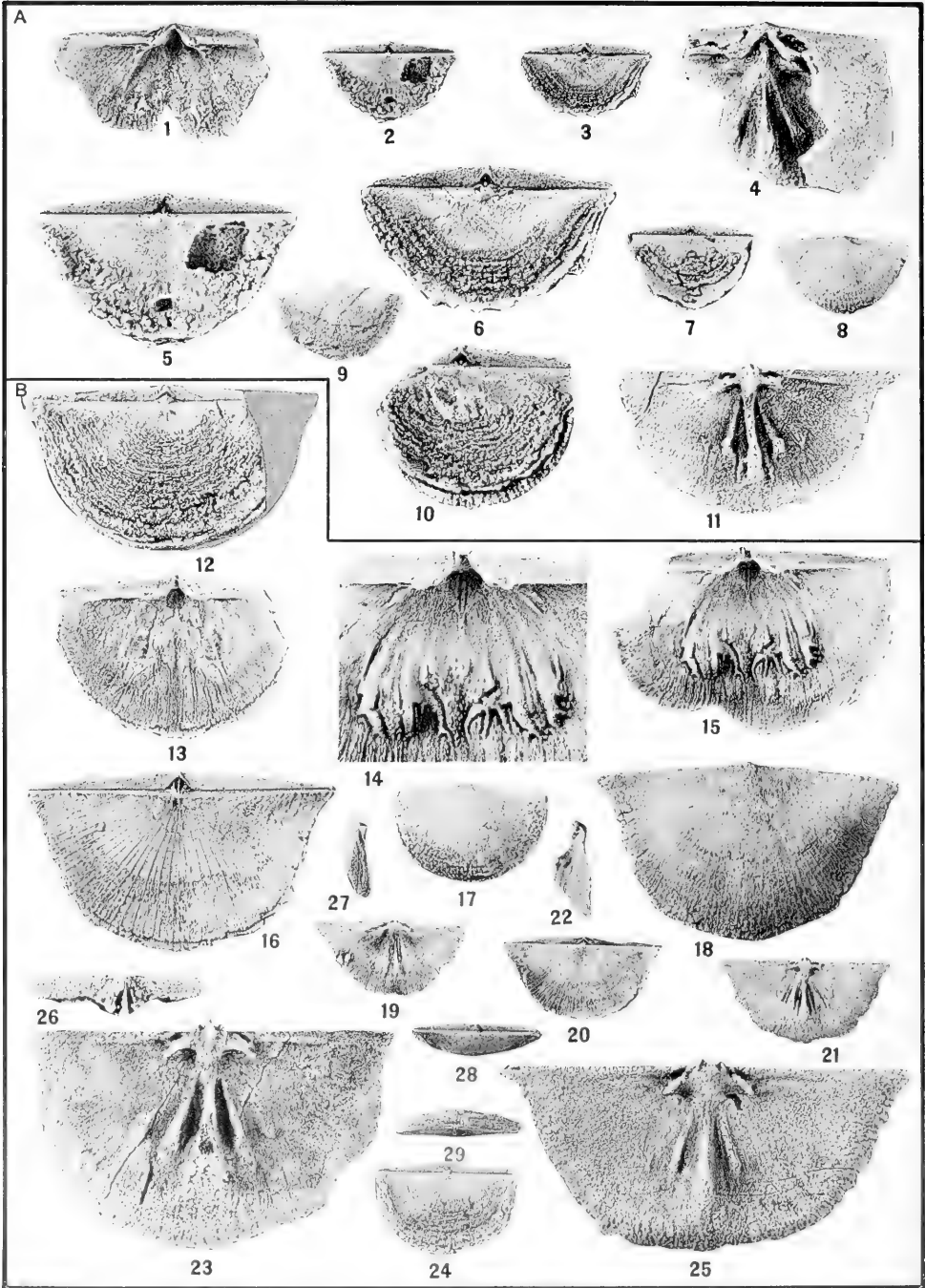


SOWERBYITES, TITANAMBONITES  
(SEE EXPLANATION OF PLATES.)



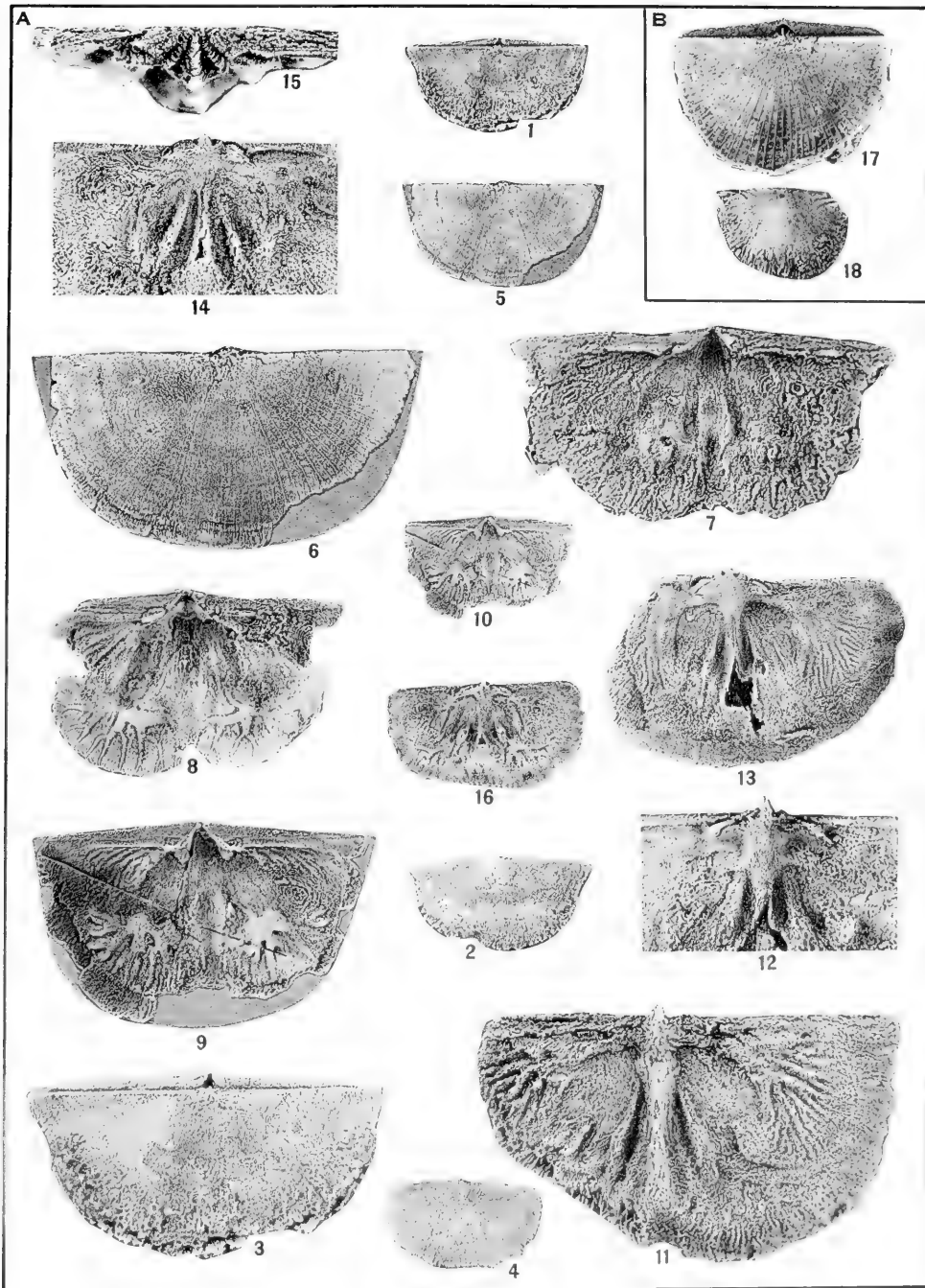


SOWERBYITES, TITANAMBONITES  
(SEE EXPLANATION OF PLATES.)

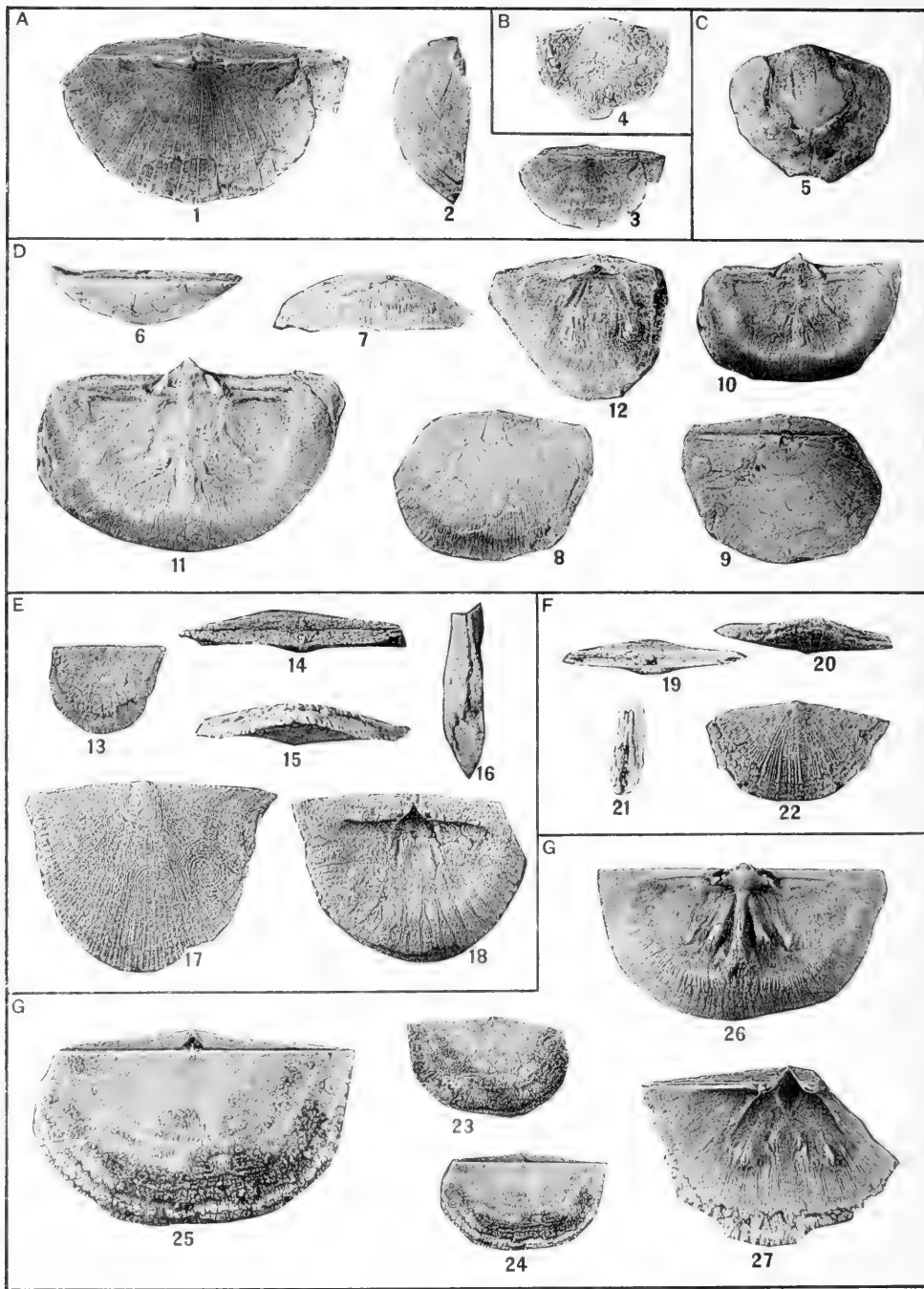


SOWERBYITES

(SEE EXPLANATION OF PLATES.)

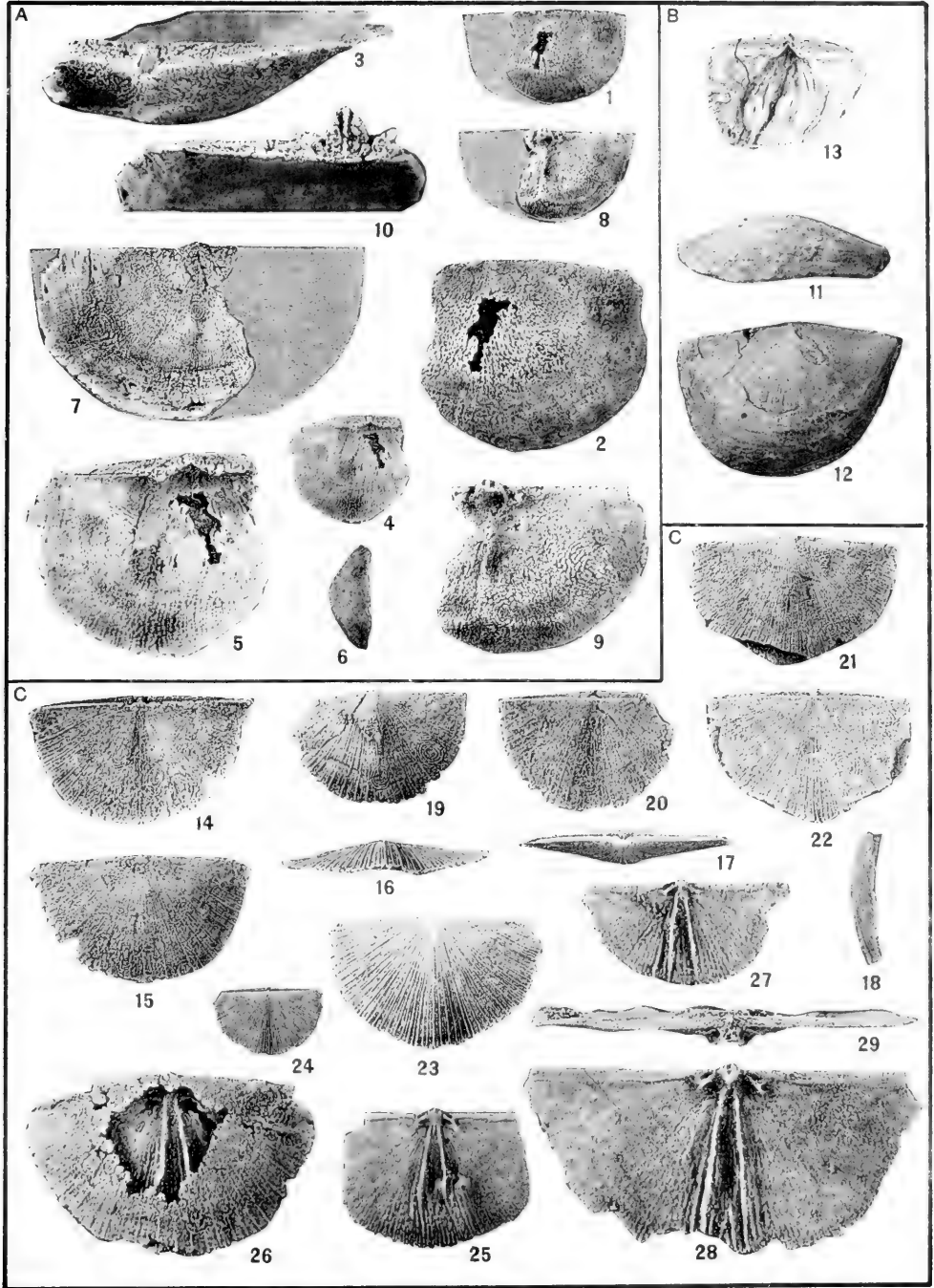


SOWERBYITES  
(SEE EXPLANATION OF PLATES.)



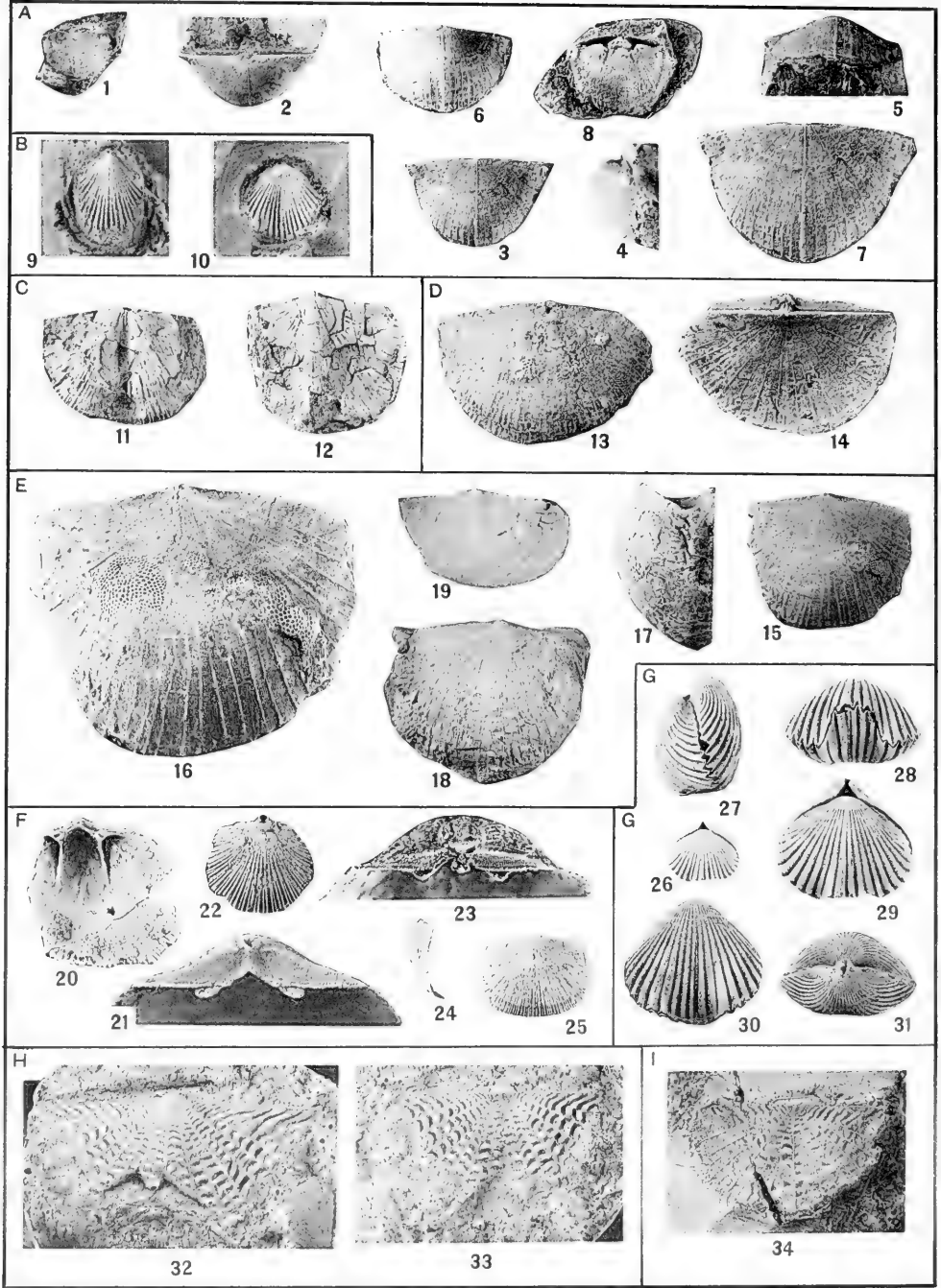
BIMURIA, EOPLECTODONTA, ISOPHRAGMA, PALAEOSTROPHOMENA, SOWERBYITES  
TITANAMBONITES

(SEE EXPLANATION OF PLATES.)



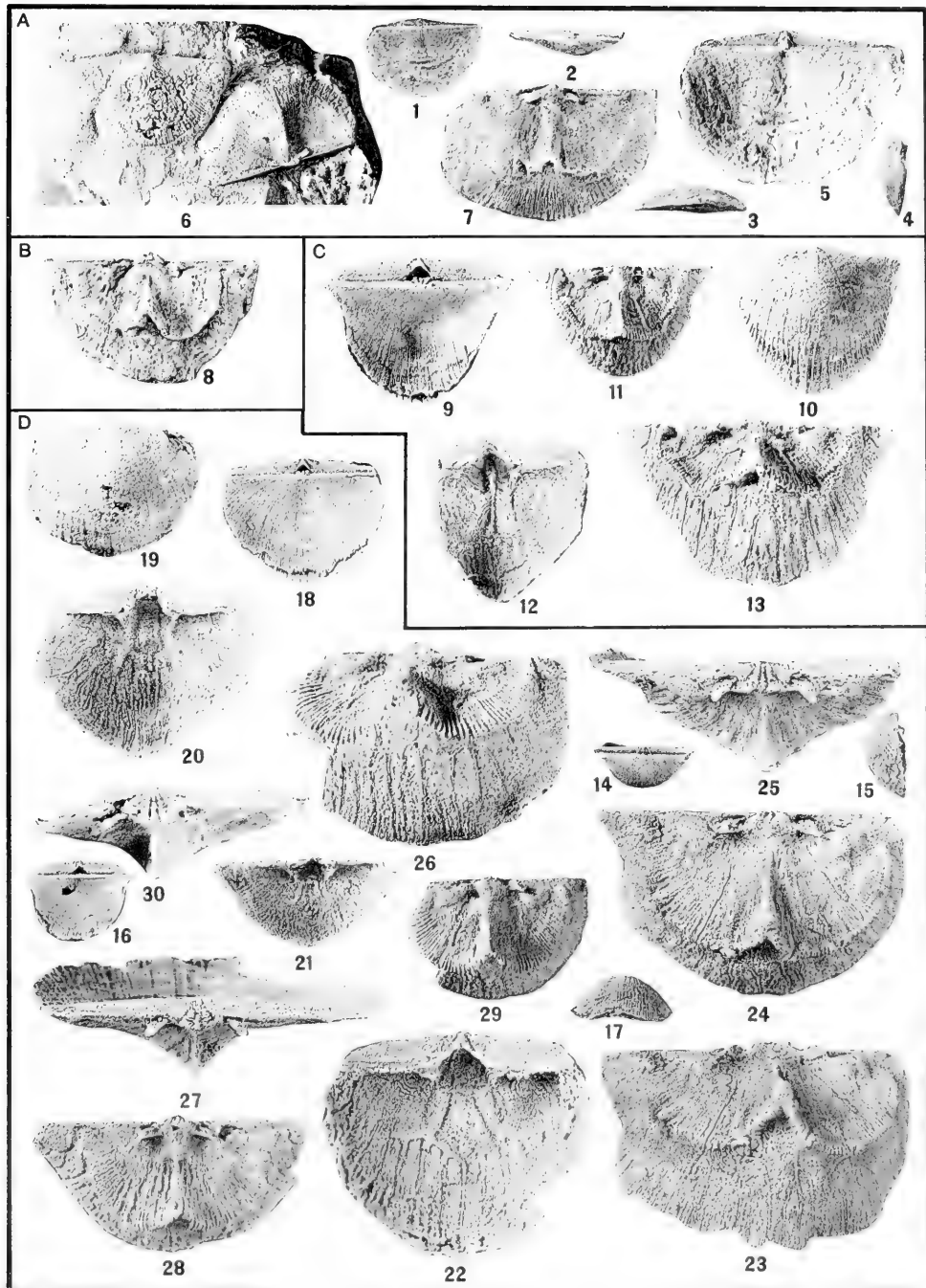
HESPEROMENA, SYNDIELASMA, TITANAMBONITES

(SEE EXPLANATION OF PLATES.)



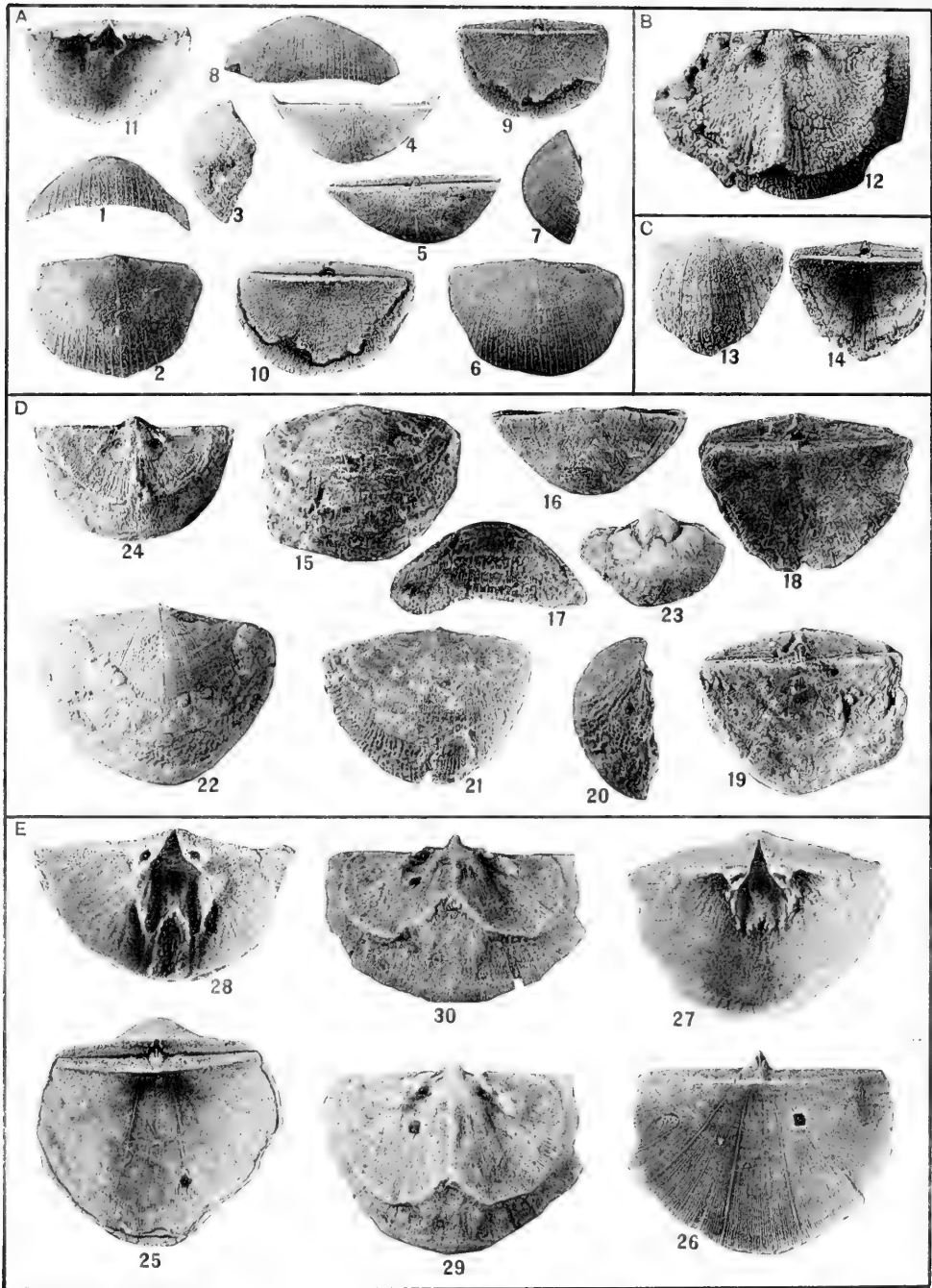
ANCISTRORHYNCHA, DACTYLOGONIA, EREMOTOECHIA, LEPTELLINA,  
PTYCHOGLYPTUS, REUSCHELLA, ZYGOSPIRA

(SEE EXPLANATION OF PLATES.)



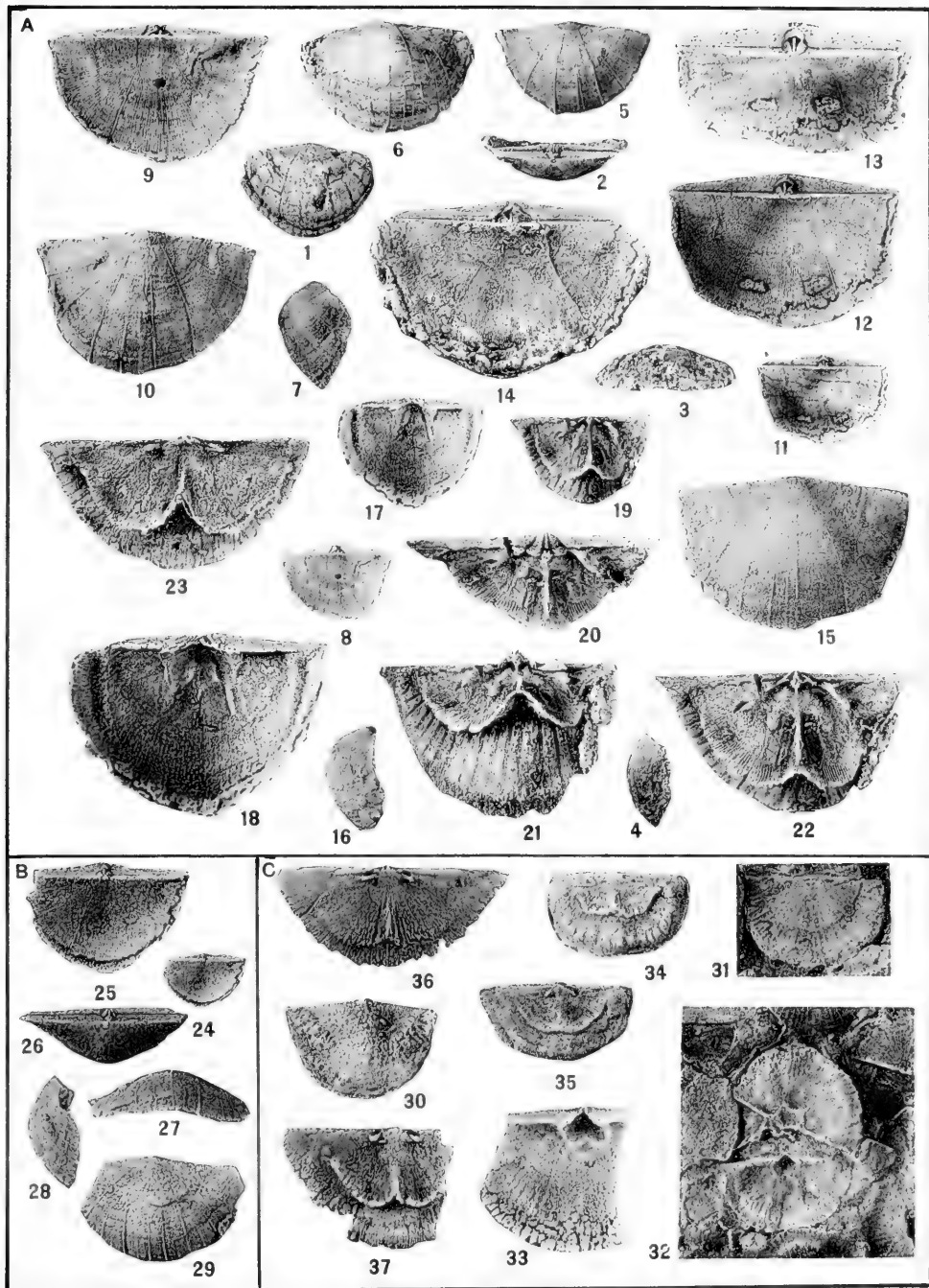
LEPTELLINA

(SEE EXPLANATION OF PLATES.)

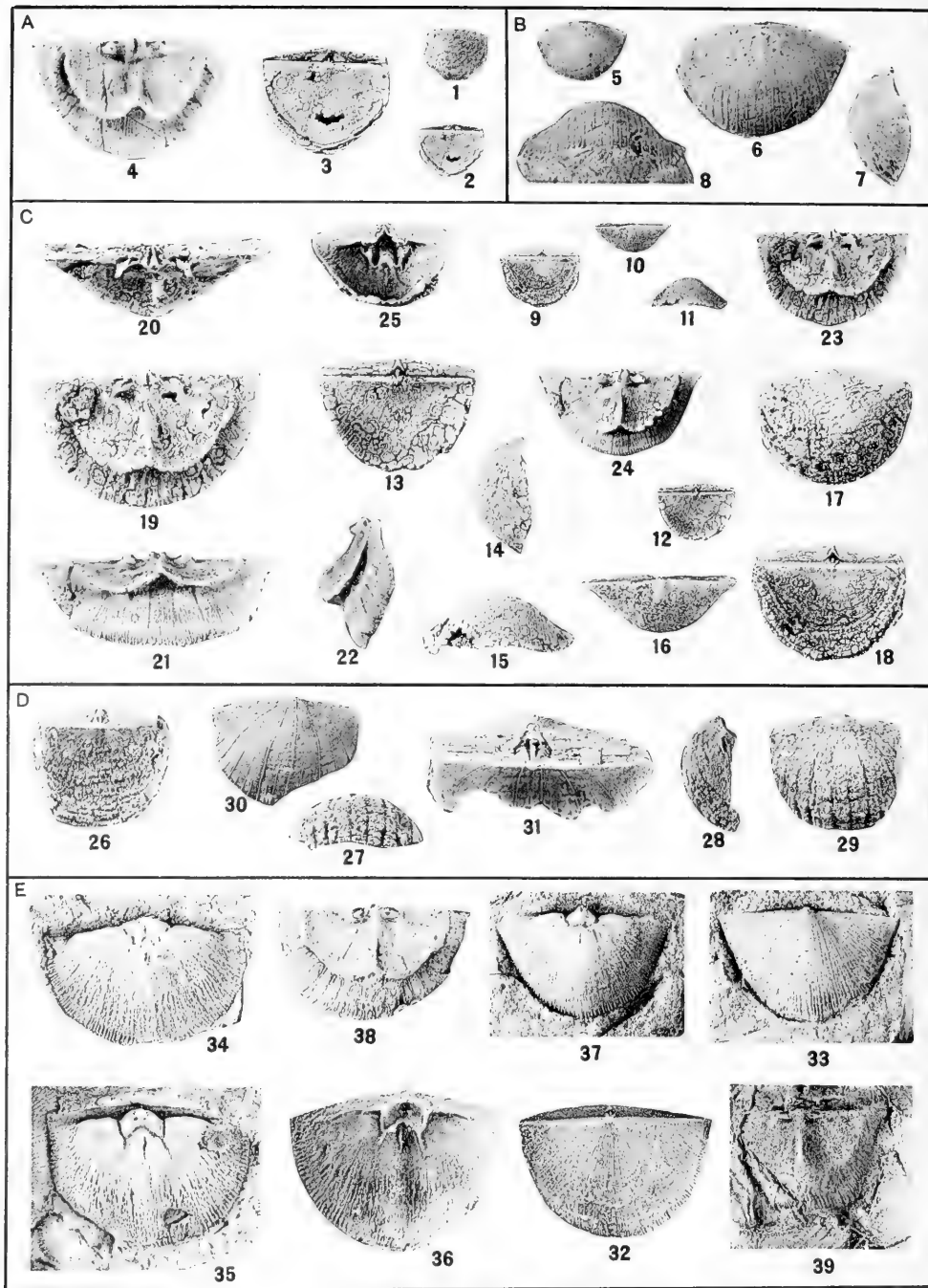


LEPTELLINA, LEPTELLOIDEA  
(SEE EXPLANATION OF PLATES.)



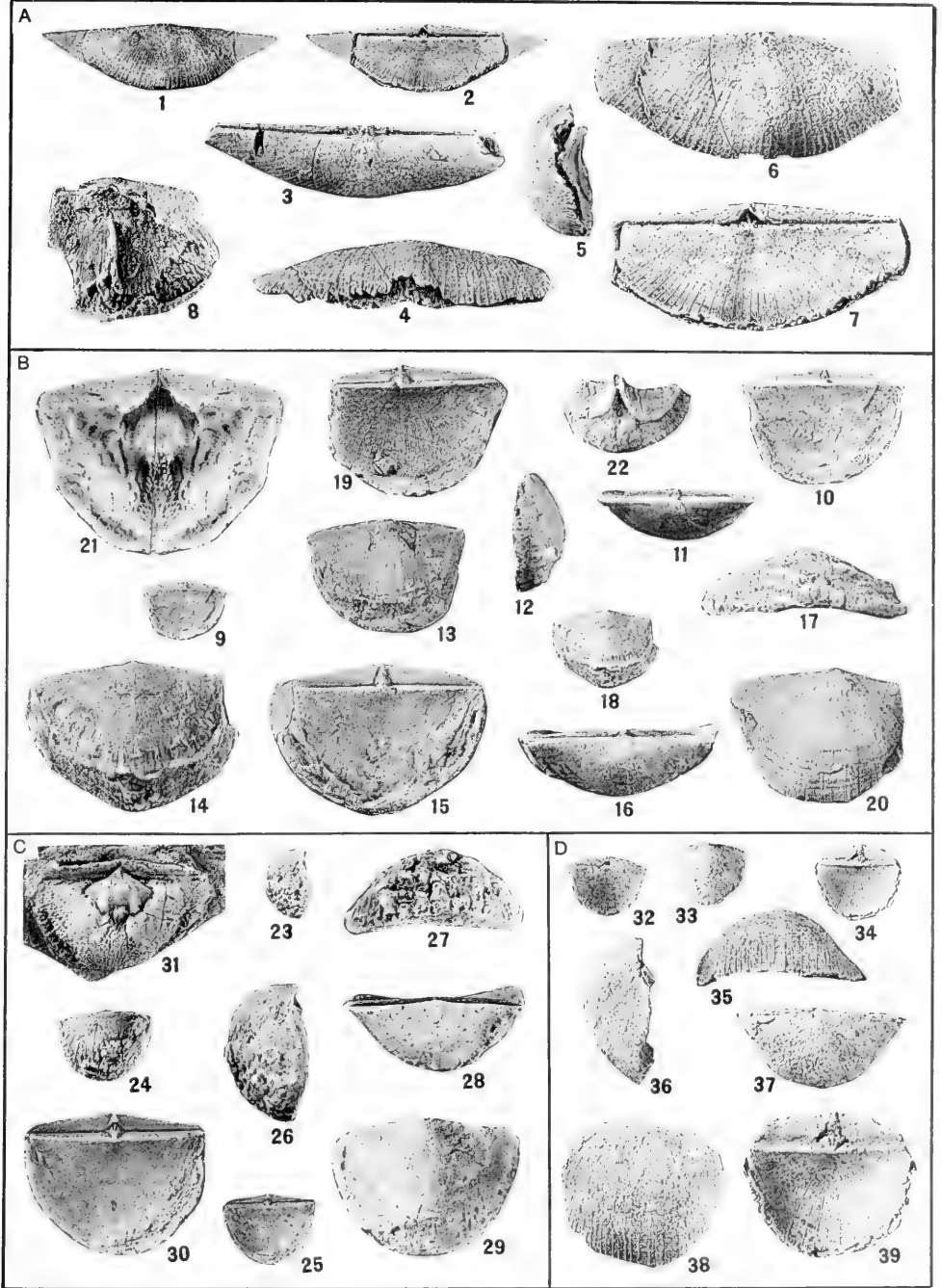


LEPTELLINA  
(SEE EXPLANATION OF PLATES.)



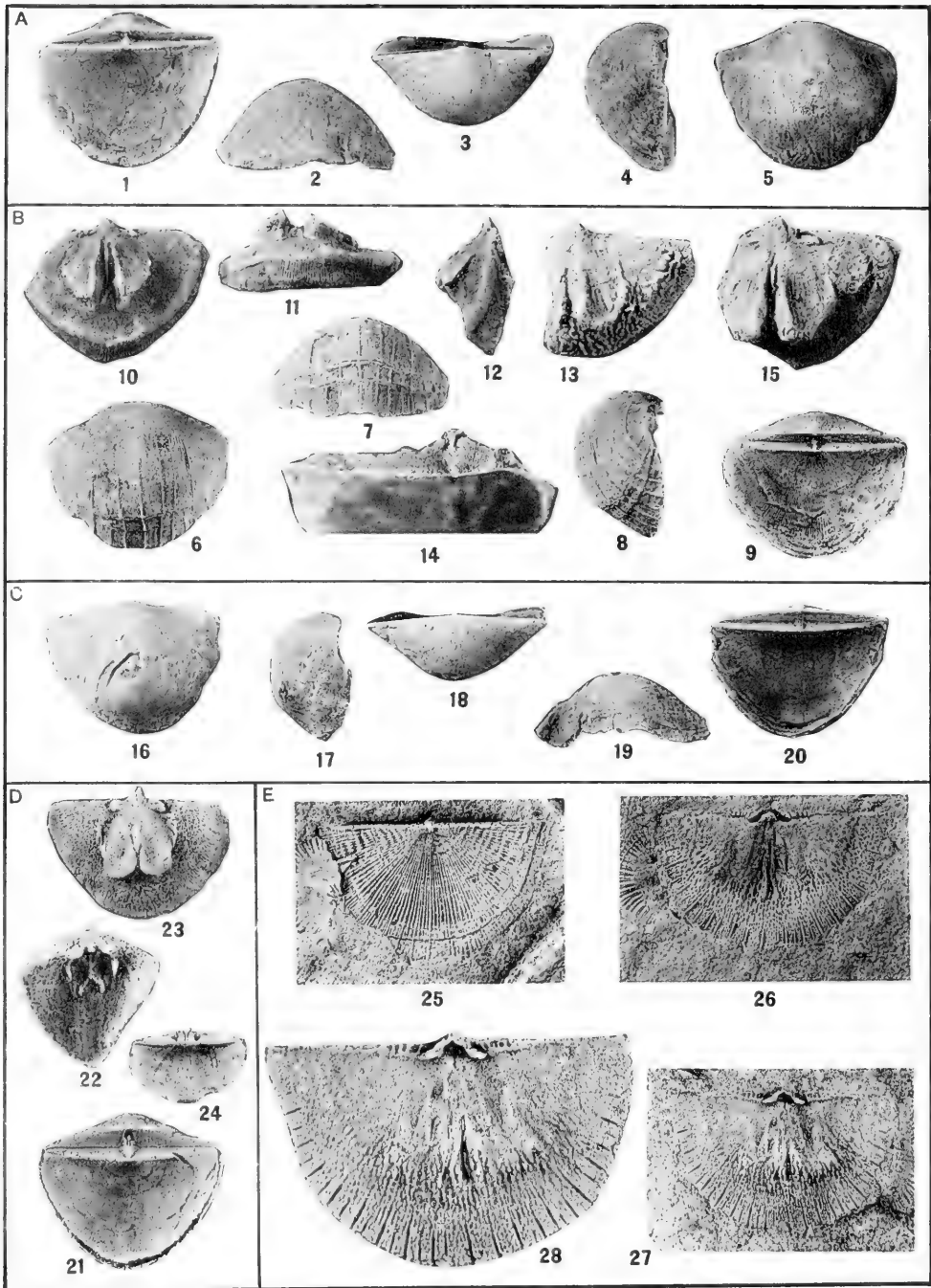
LEPTELLINA

(SEE EXPLANATION OF PLATES.)

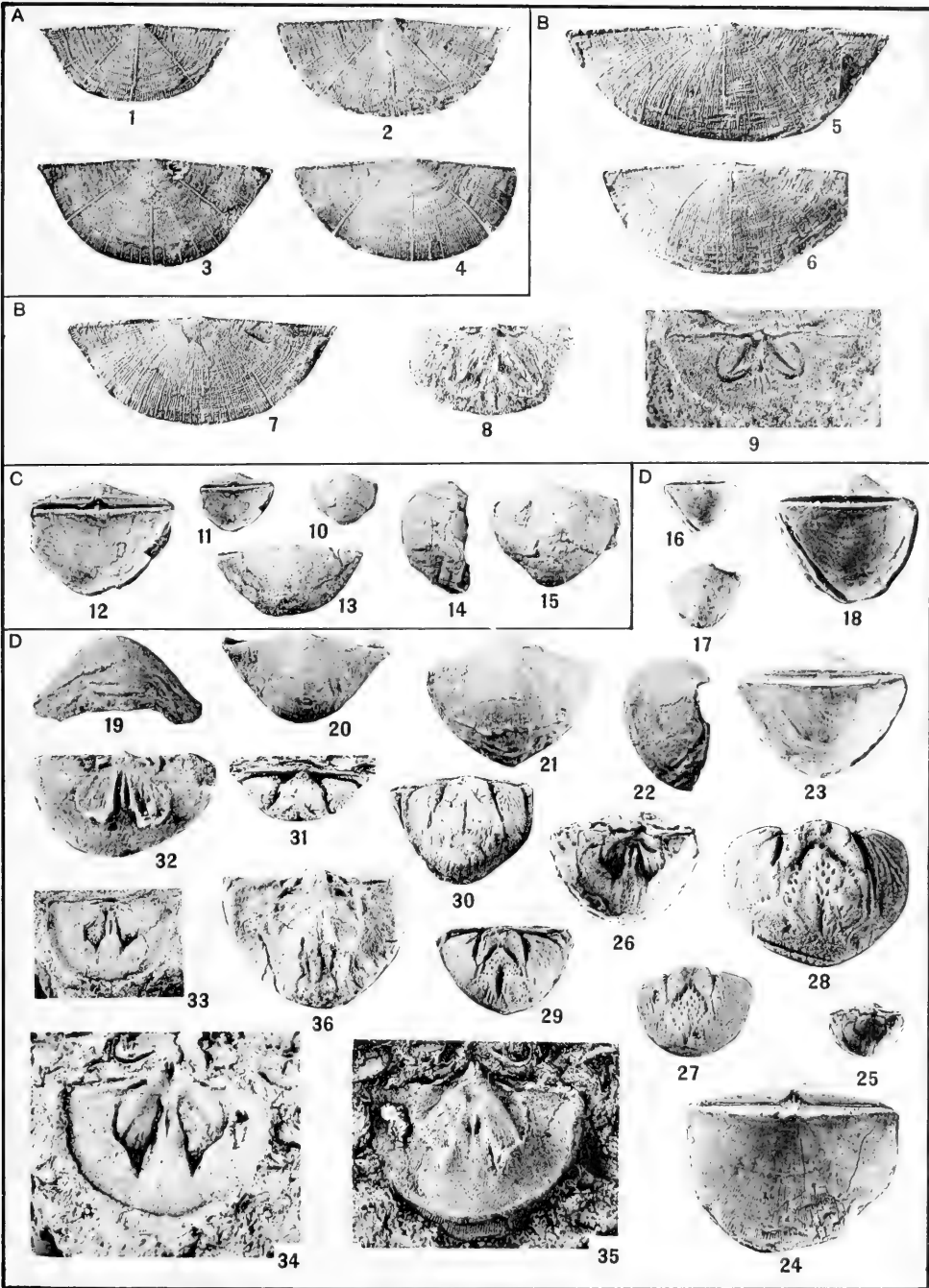


LEPTELLINA

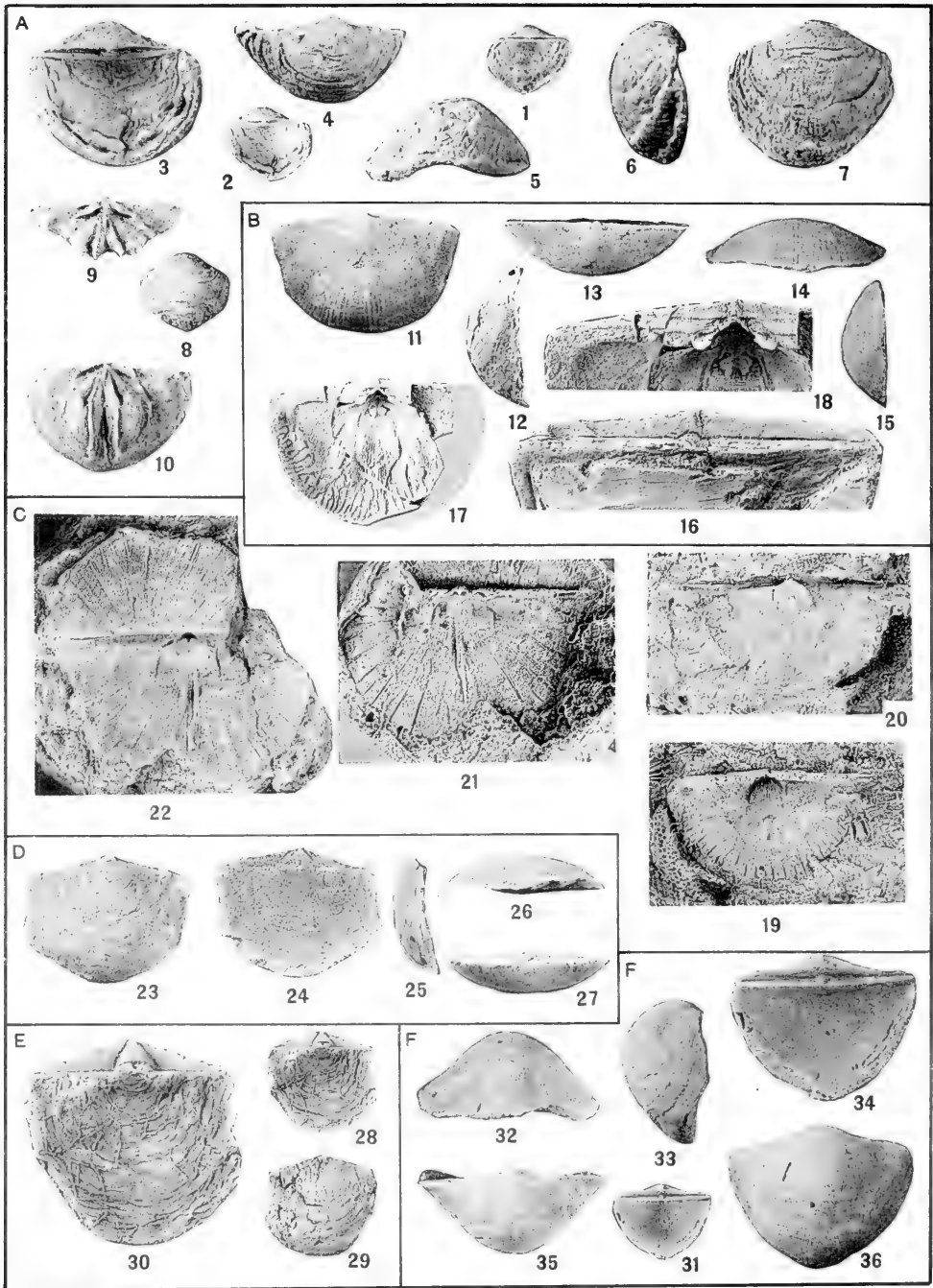
(SEE EXPLANATION OF PLATES.)



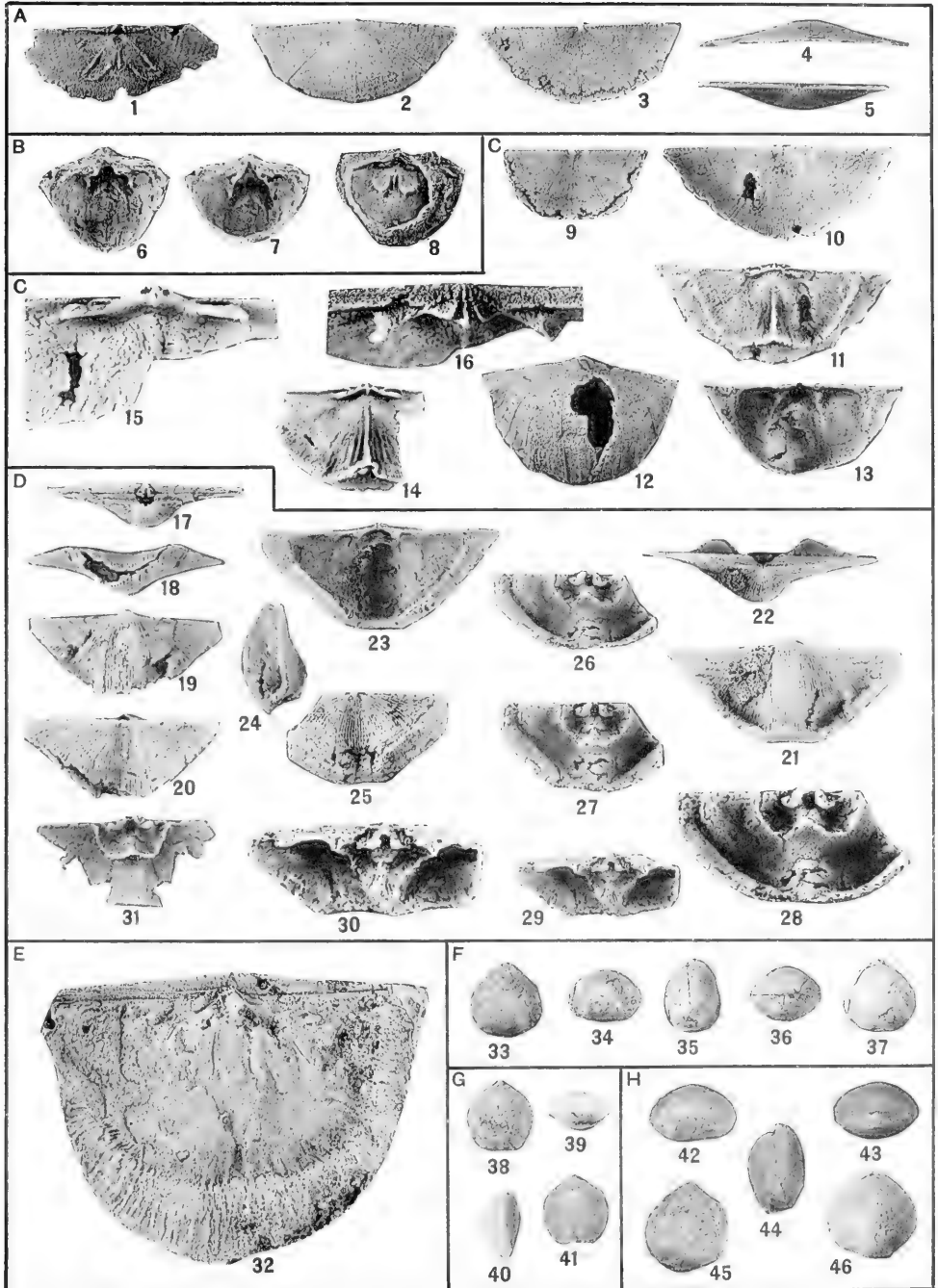
**BILOBIA, EOPLECTODONTA**  
(SEE EXPLANATION OF PLATES.)



ANISOPLEURELLA, BILOBIA  
 (SEE EXPLANATION OF PLATES.)

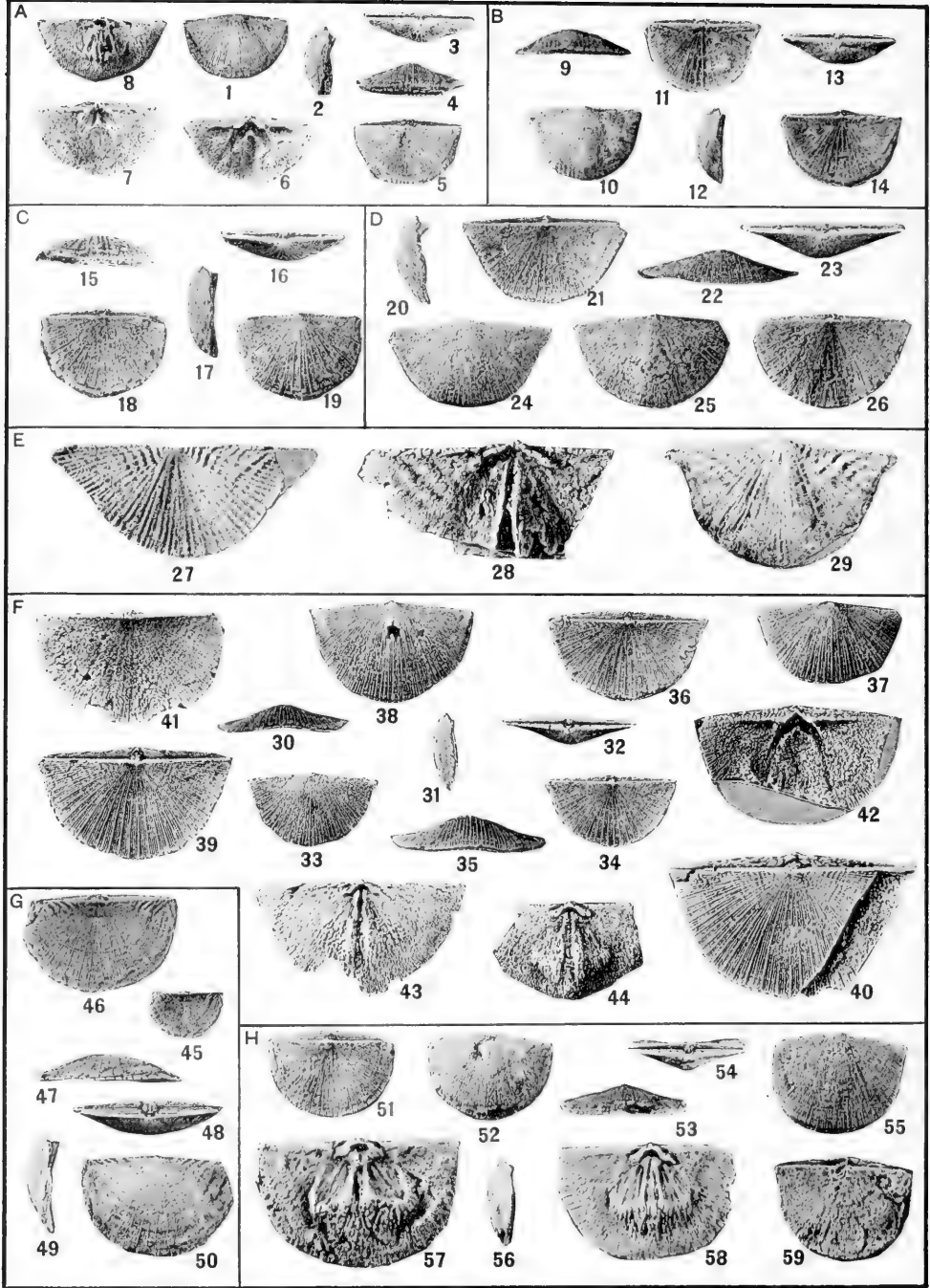


BILOBIA, BIMURIA, DACTYLOGONIA, PALAEOSTROPHOMENA, TITANAMBONITES  
(SEE EXPLANATION OF PLATES.)



ANISOPLEURELLA, BILOBIA, IDIOSPIRA, LEPTELLINA, TOQUIMIA, XENAMBONITES

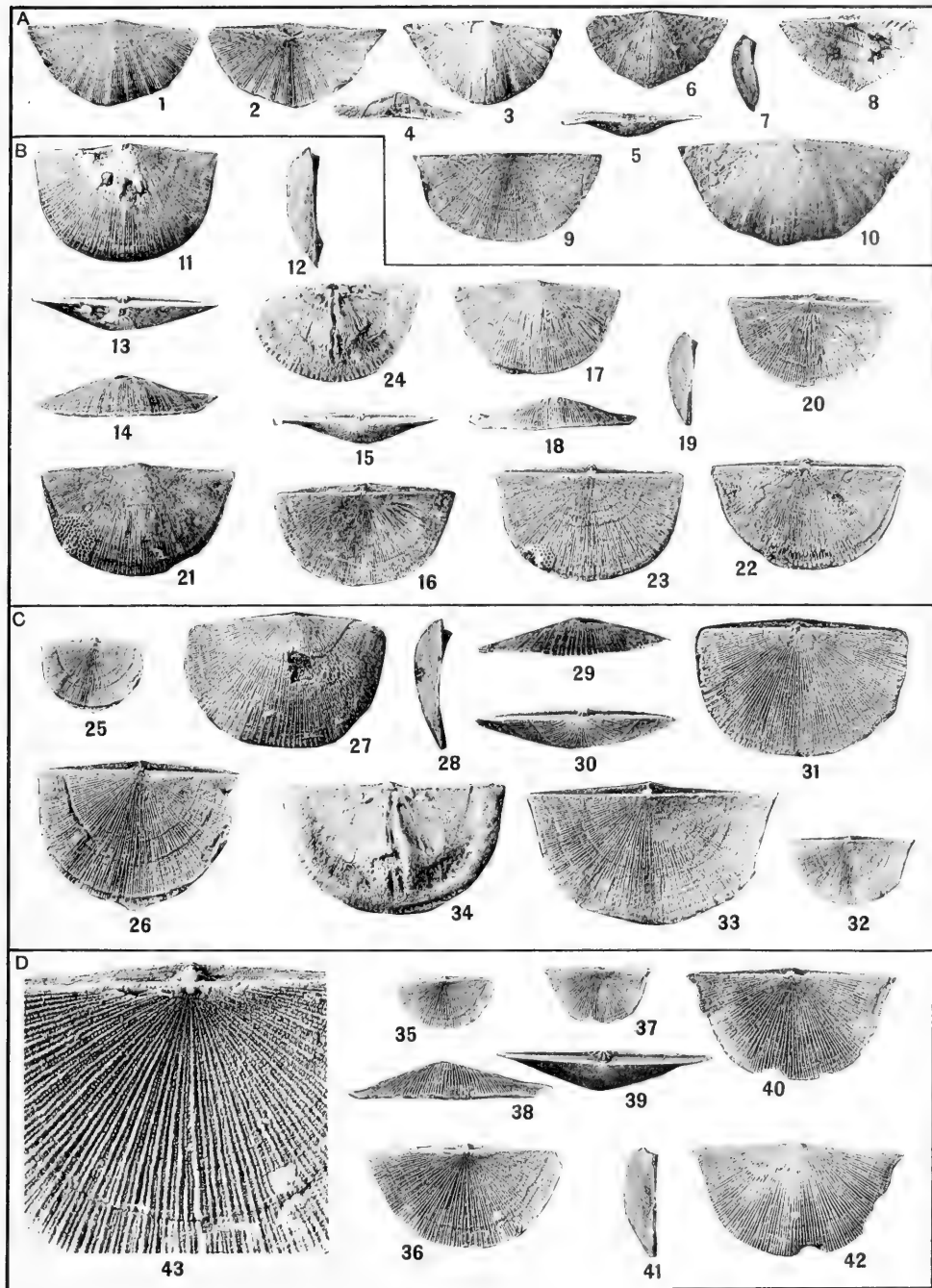
(SEE EXPLANATION OF PLATES.)



SOWERBYELLA

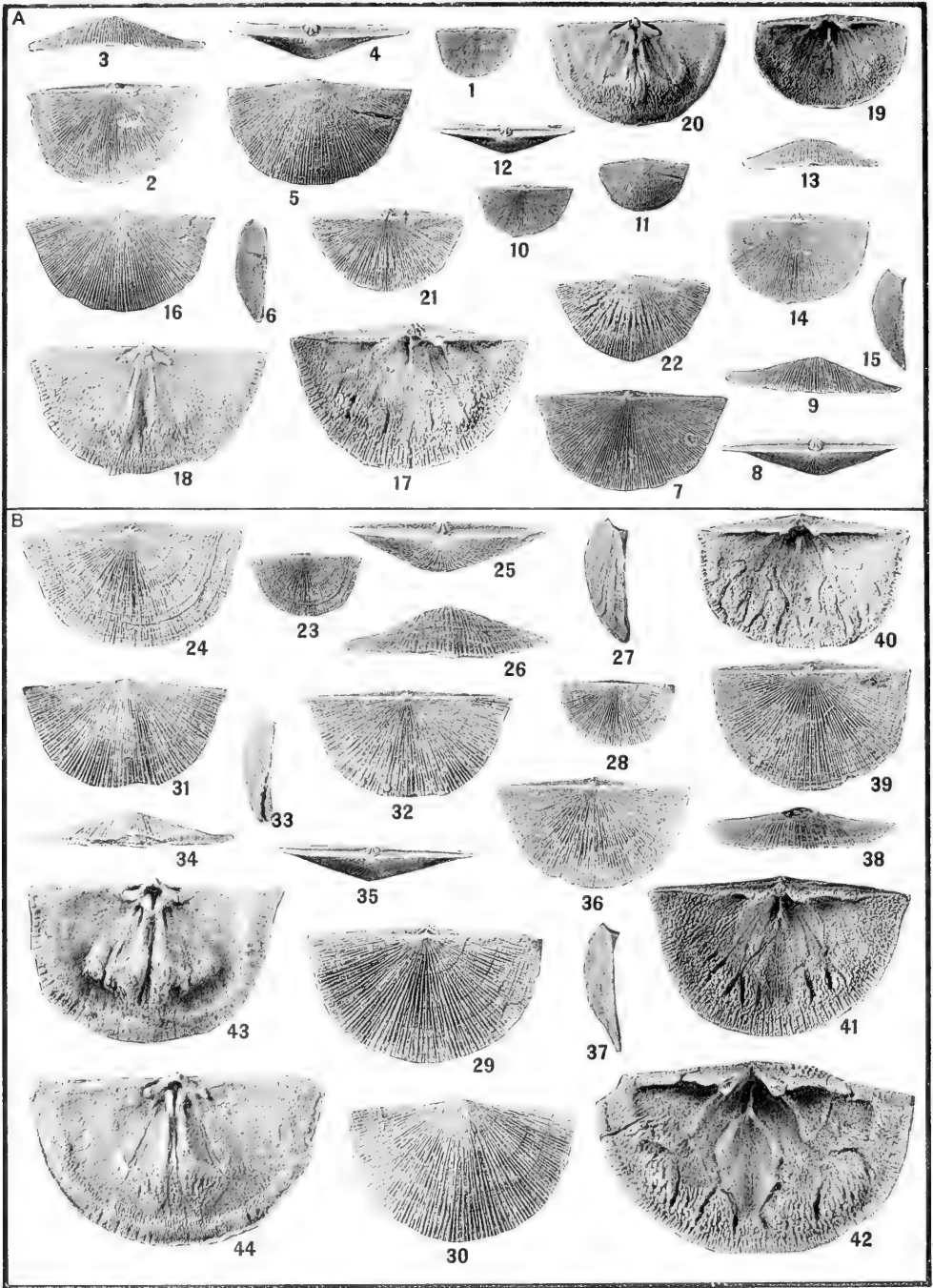
(SEE EXPLANATION OF PLATES.)





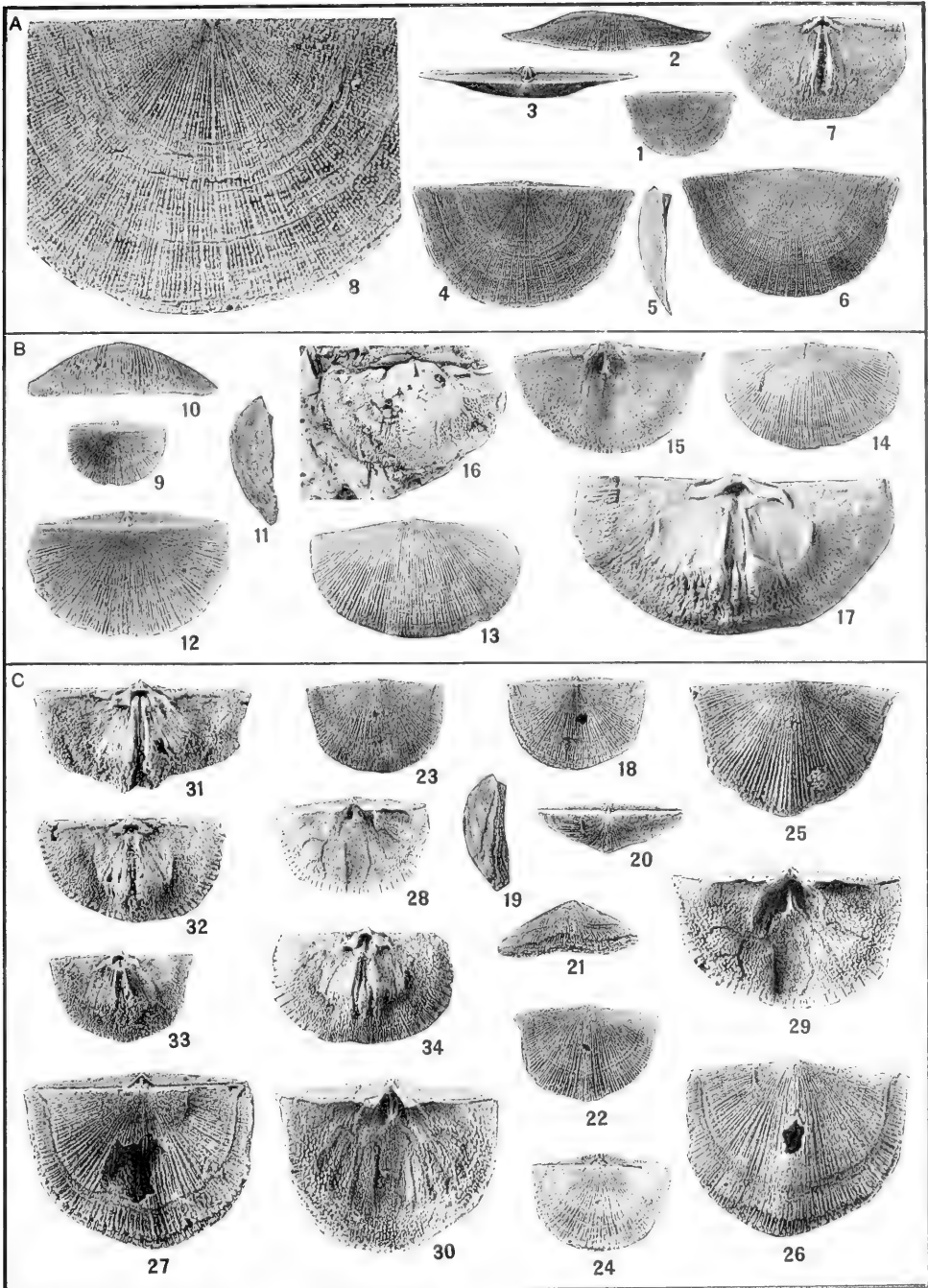
SOWERBYELLA

(SEE EXPLANATION OF PLATES.)

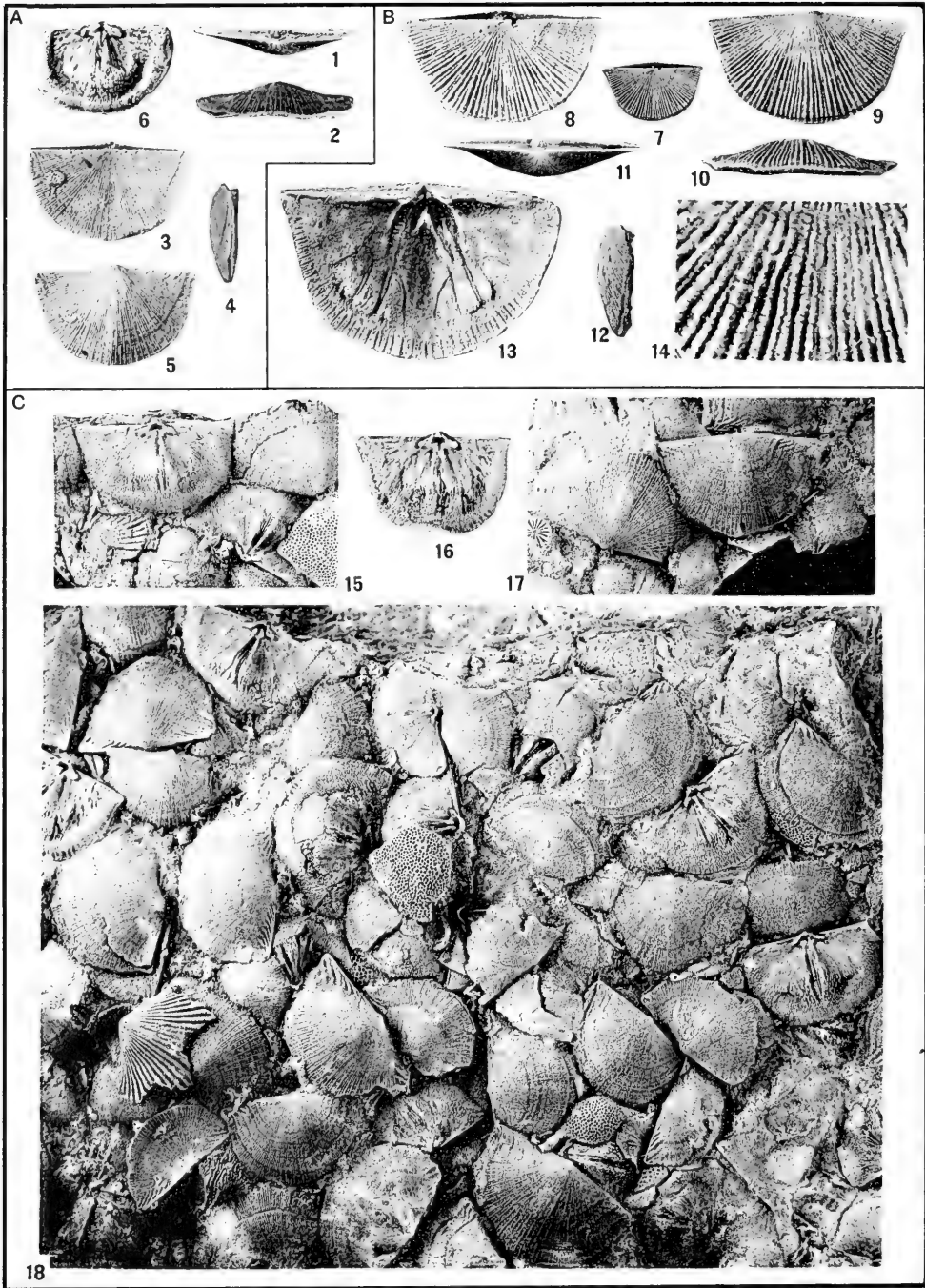


SOWERBYELLA

(SEE EXPLANATION OF PLATES.)

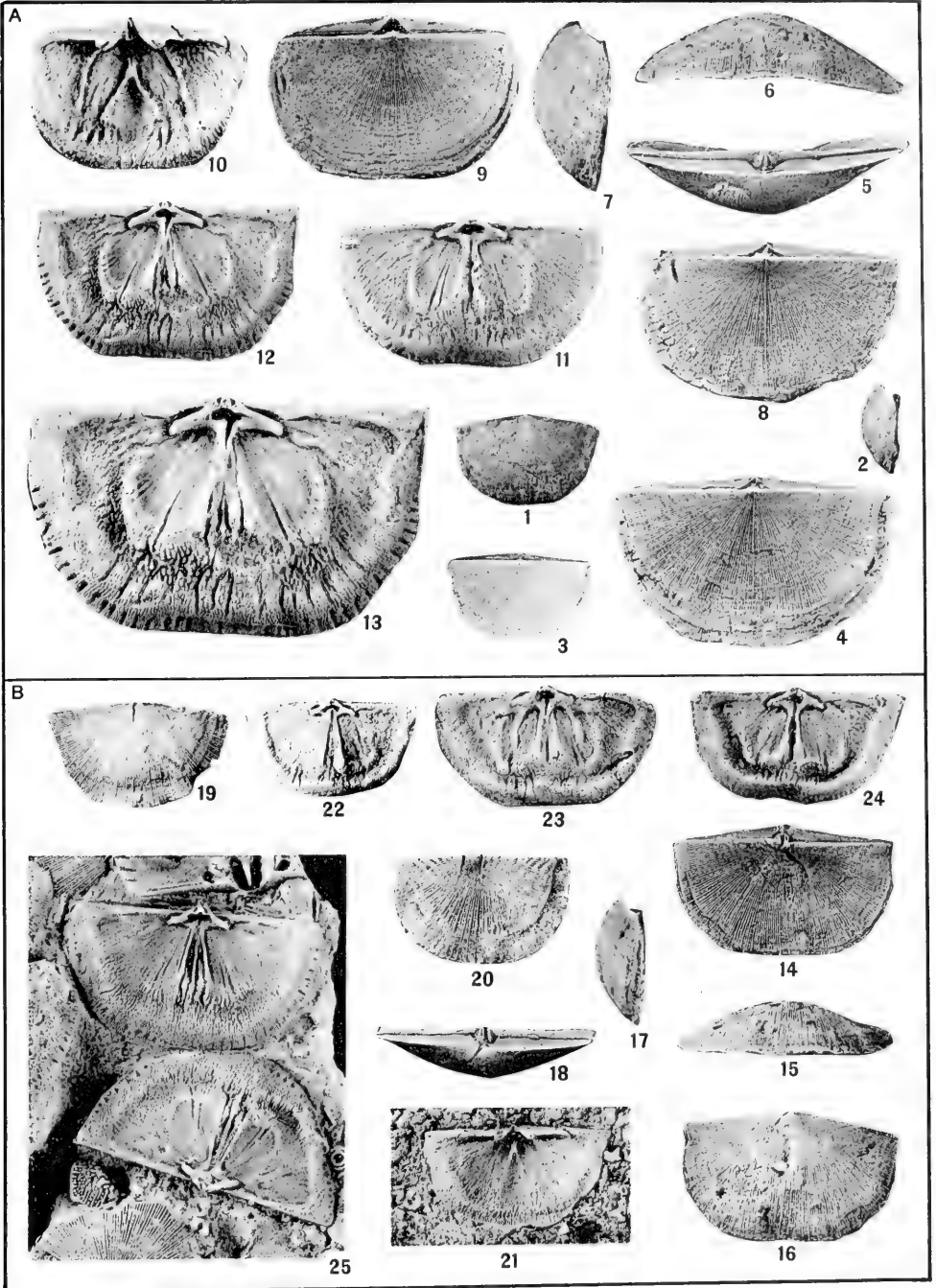


SOWERBYELLA  
(SEE EXPLANATION OF PLATES.)



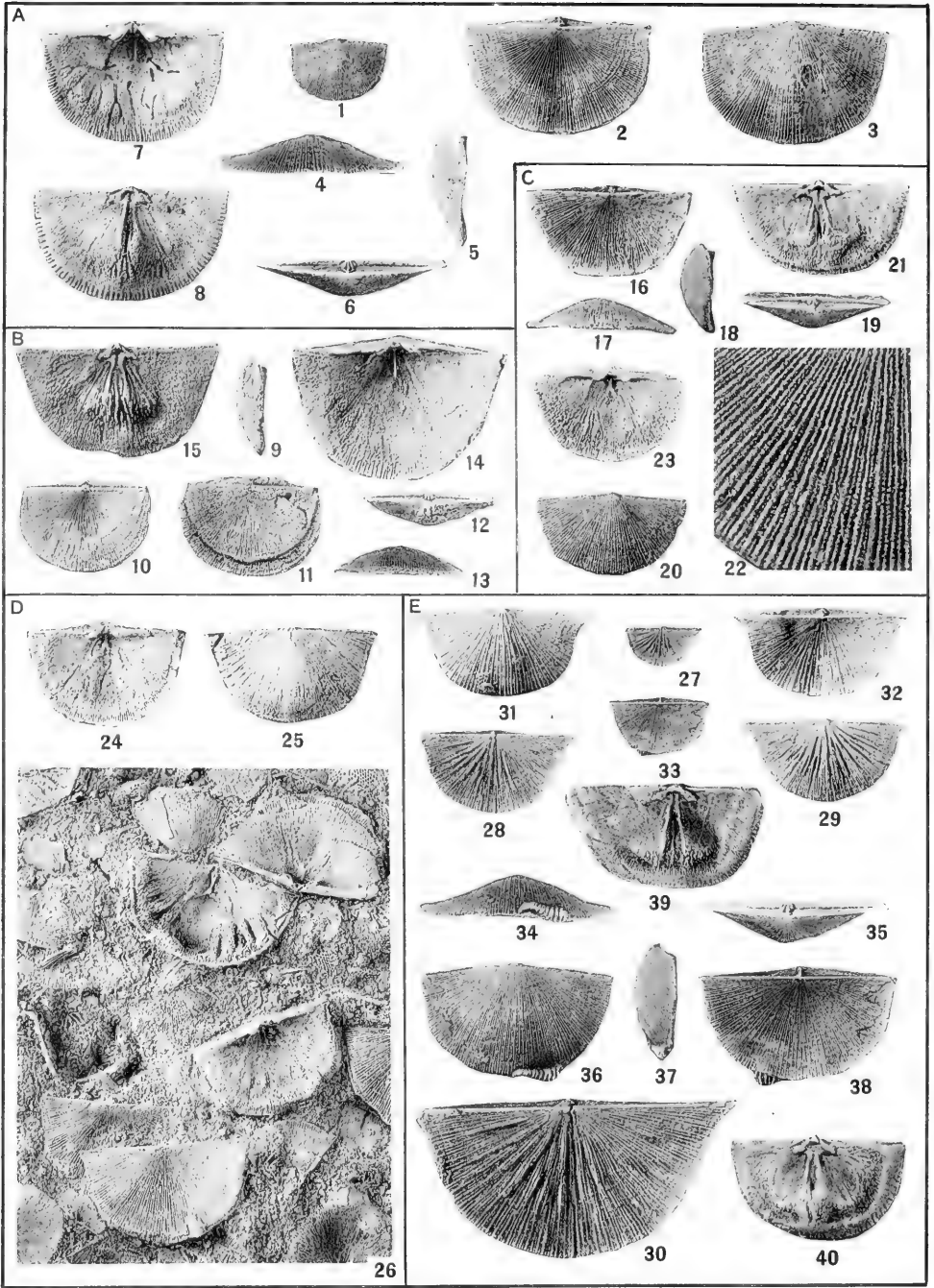
SOWERBYELLA

(SEE EXPLANATION OF PLATES.)



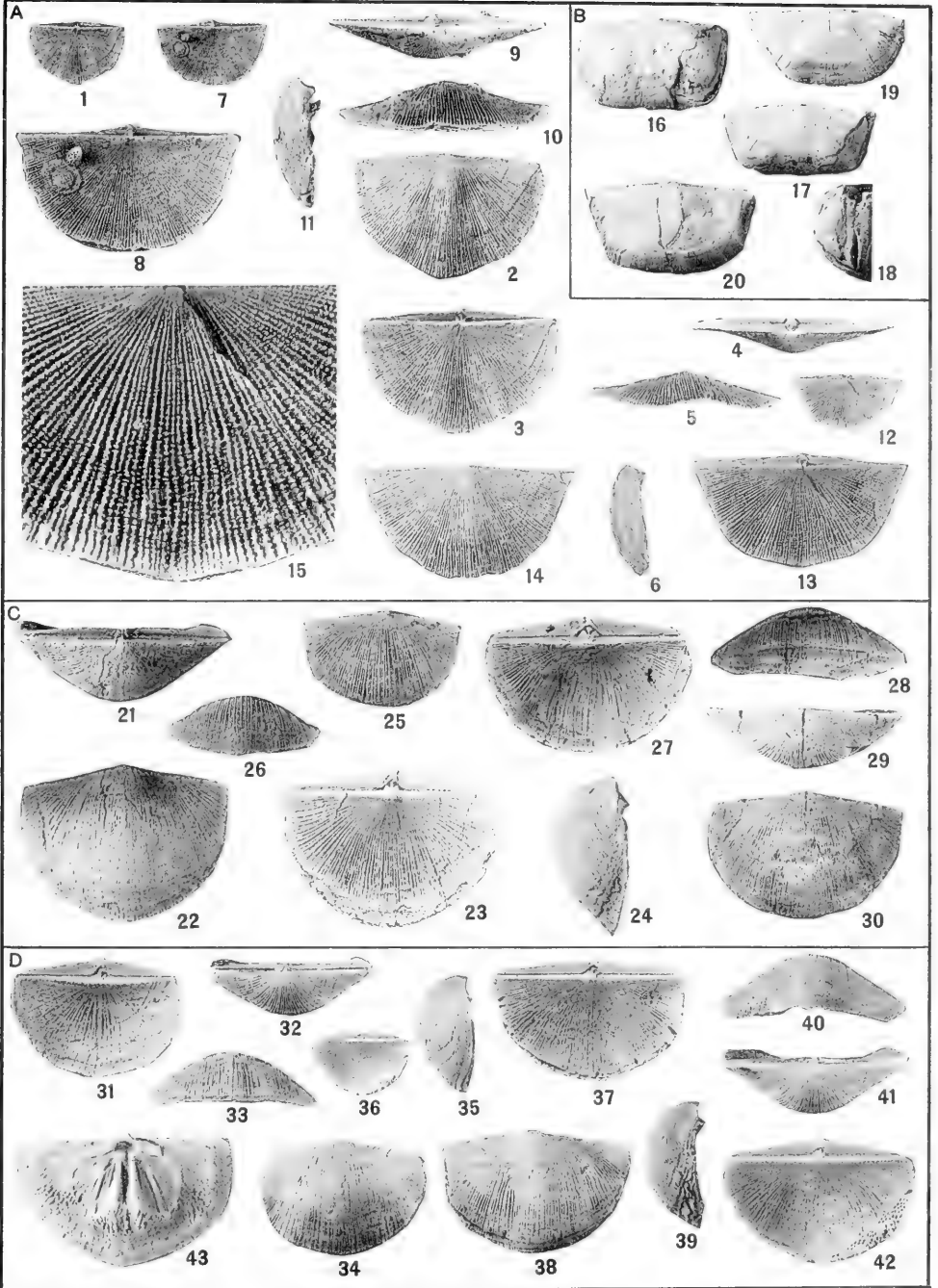
SOWERBYELLA

(SEE EXPLANATION OF PLATES.)



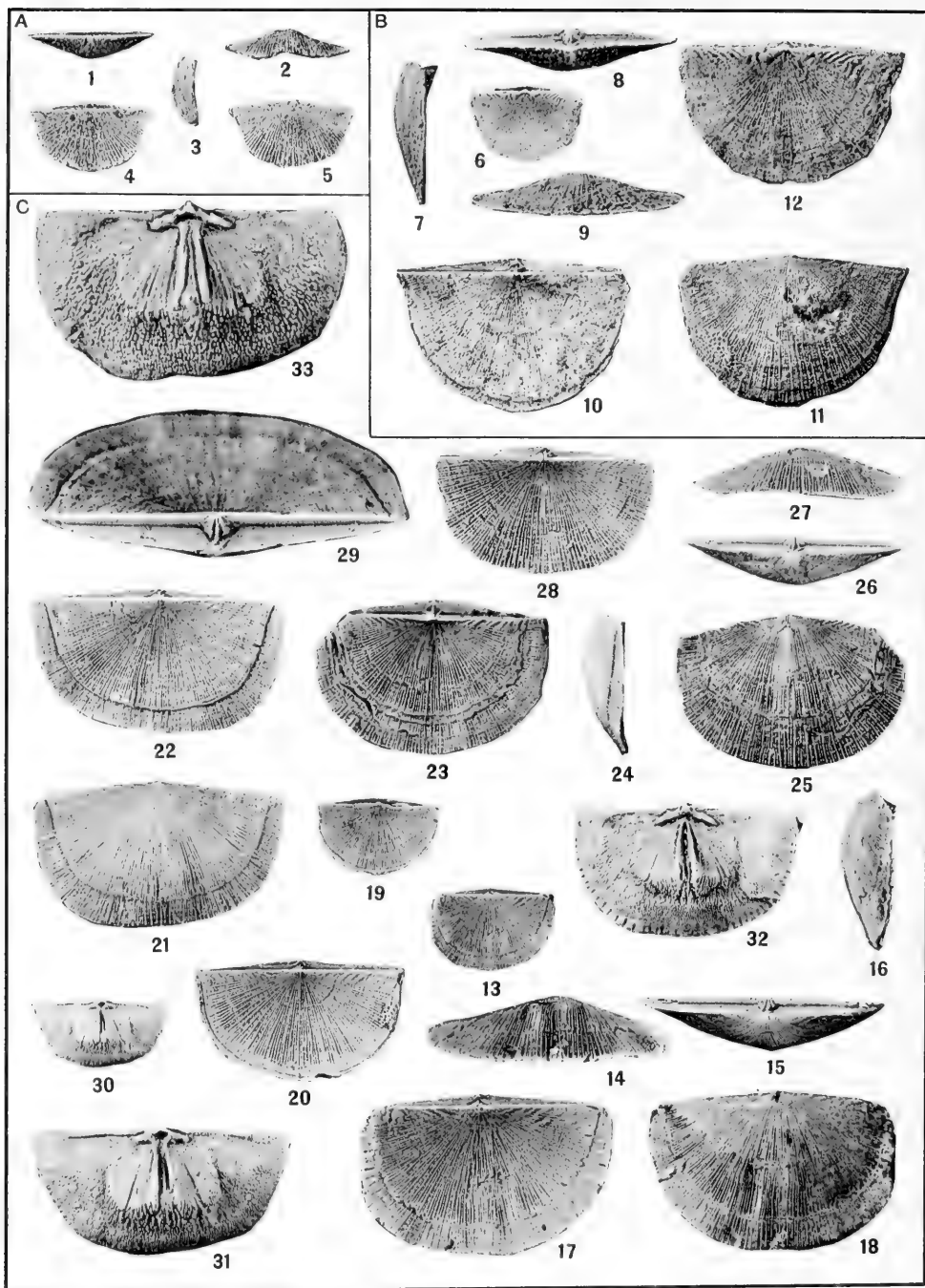
SOWERBYELLA

(SEE EXPLANATION OF PLATES.)



EOPLECTODONTA, SOWERBYELLA

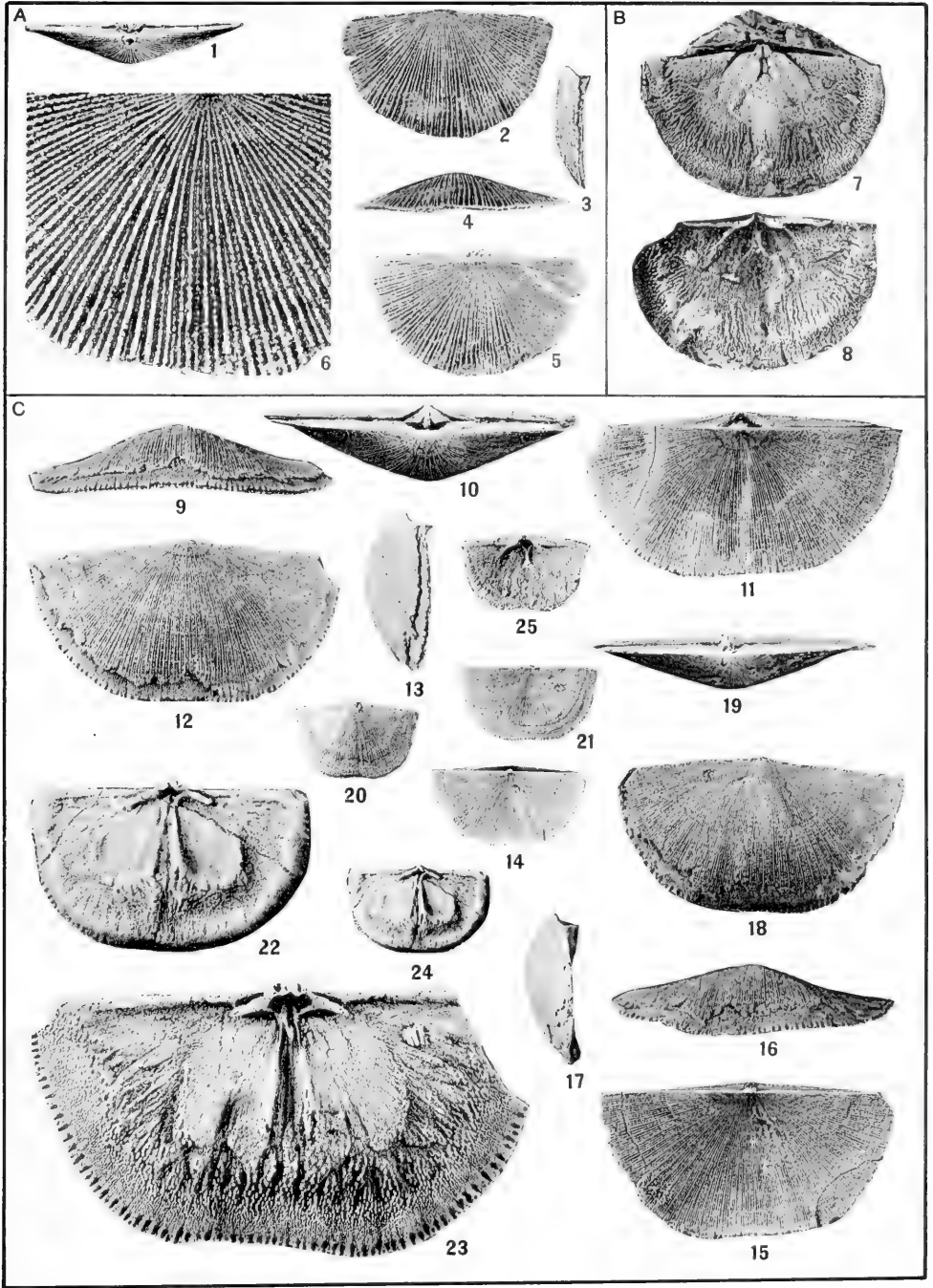
(SEE EXPLANATION OF PLATES.)



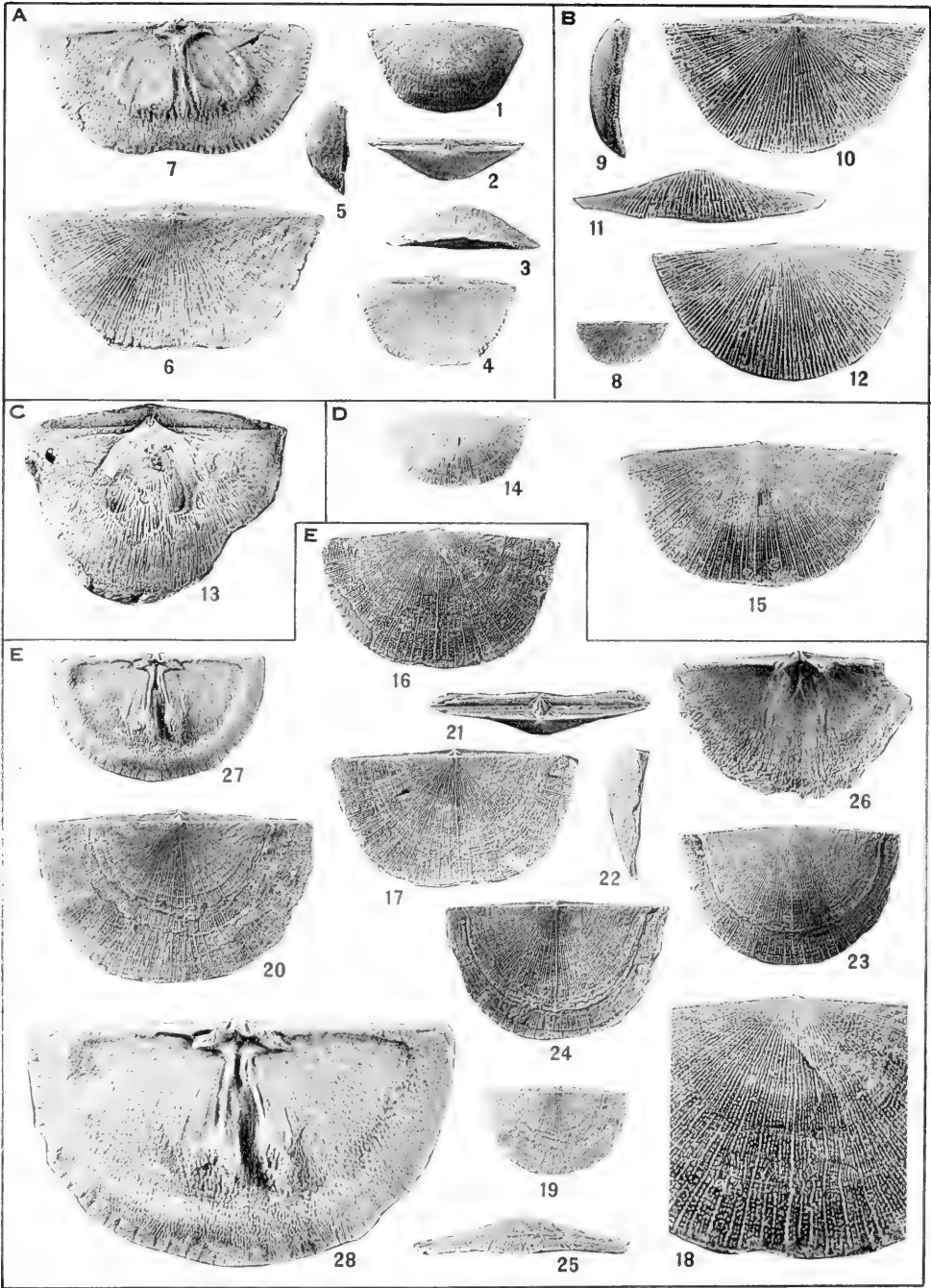
SOWERBYELLA

(SEE EXPLANATION OF PLATES.)



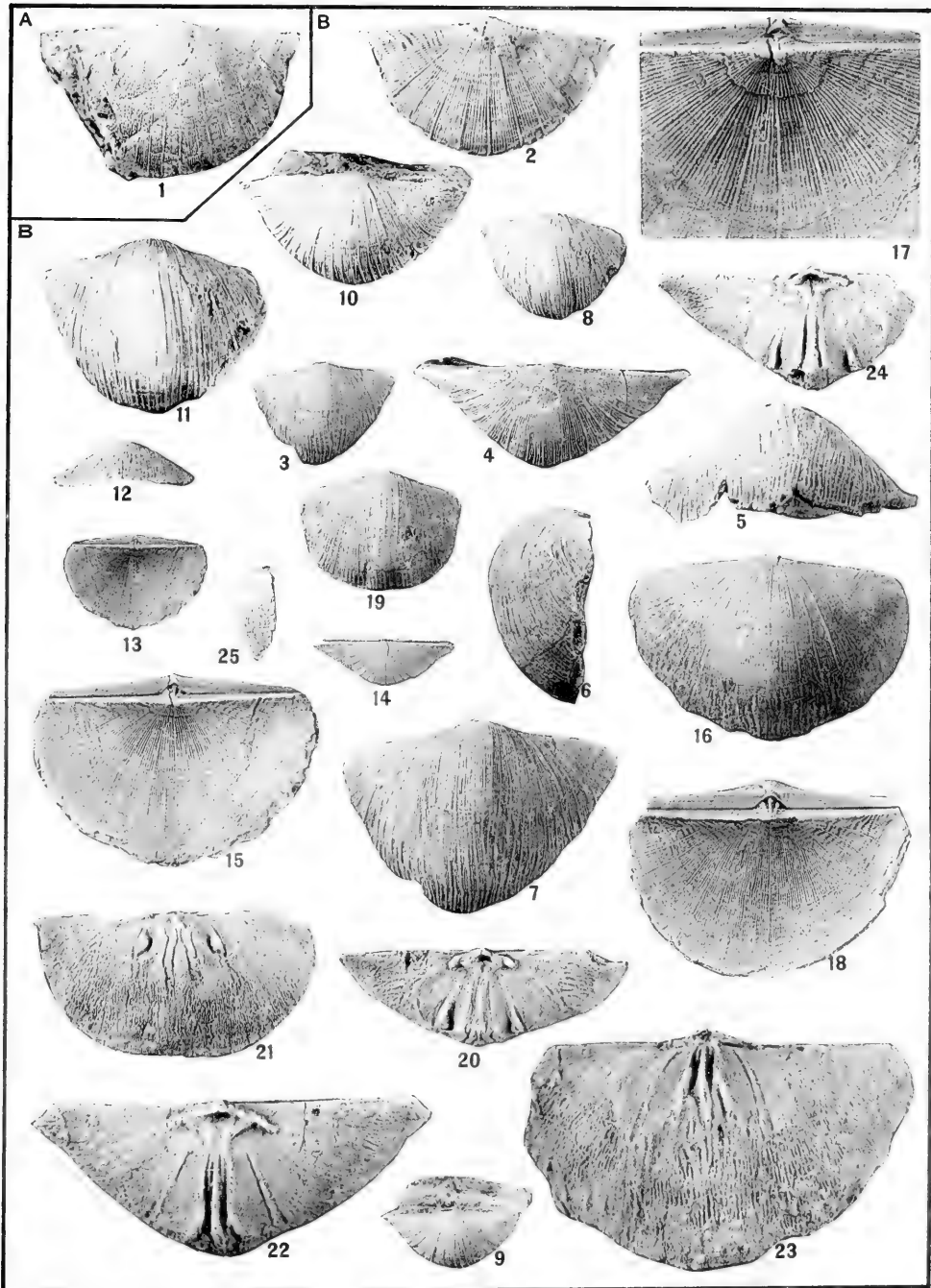


SOWERBYELLA  
(SEE EXPLANATION OF PLATES.)

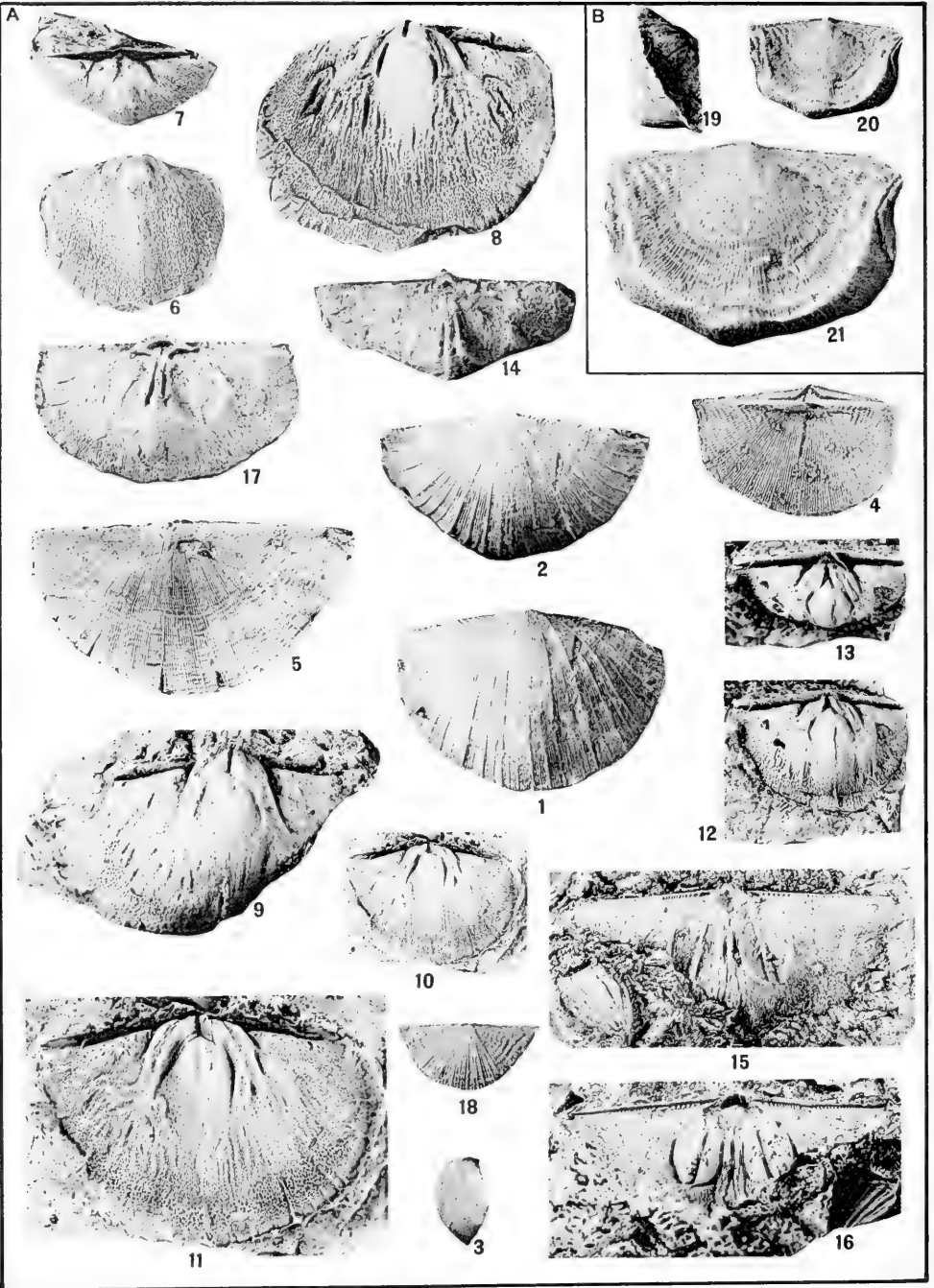


SOWERBYELLA, TITANAMBONITES

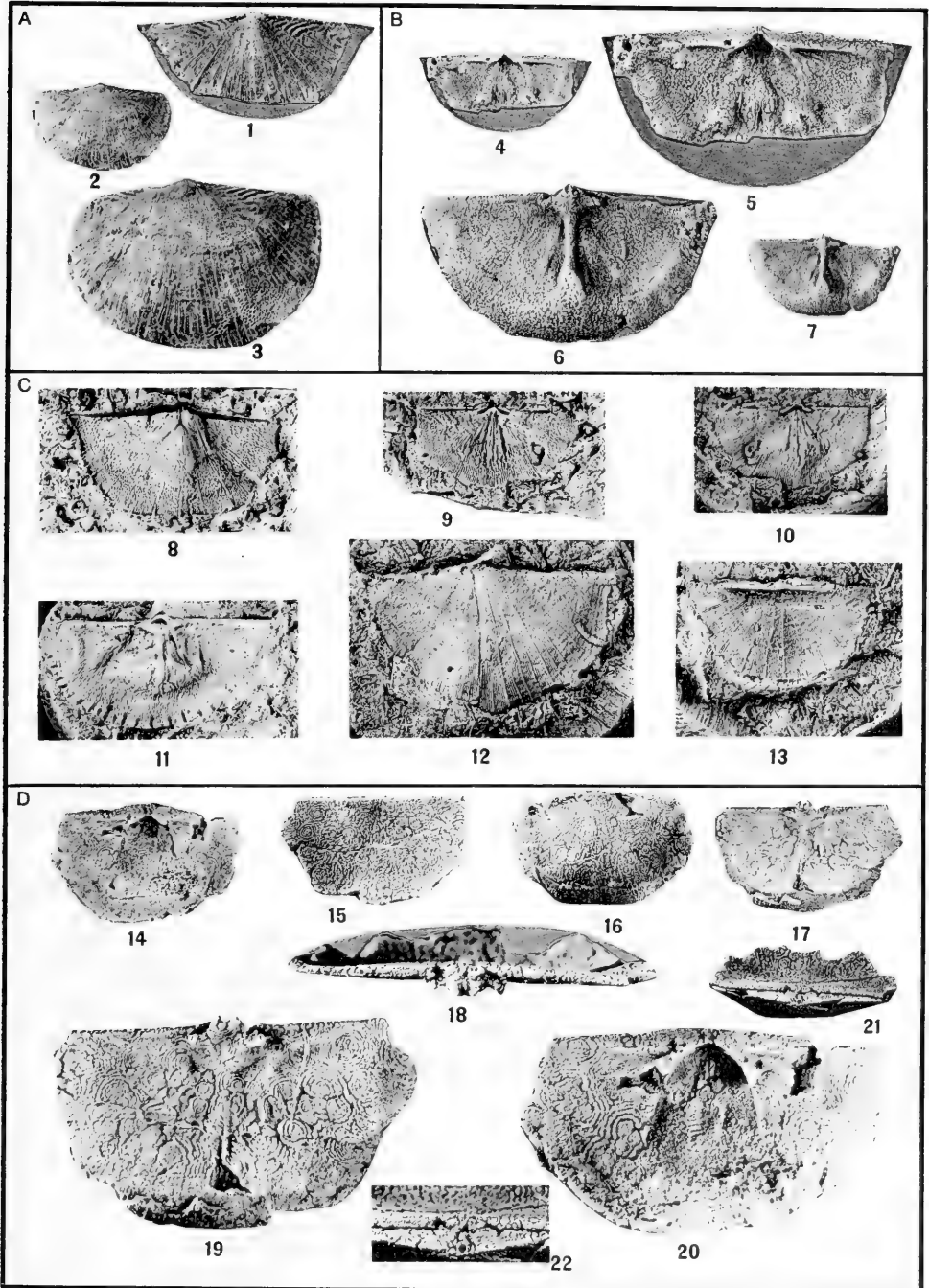
(SEE EXPLANATION OF PLATES.)



EOPLECTODONTA  
(SEE EXPLANATION OF PLATES.)

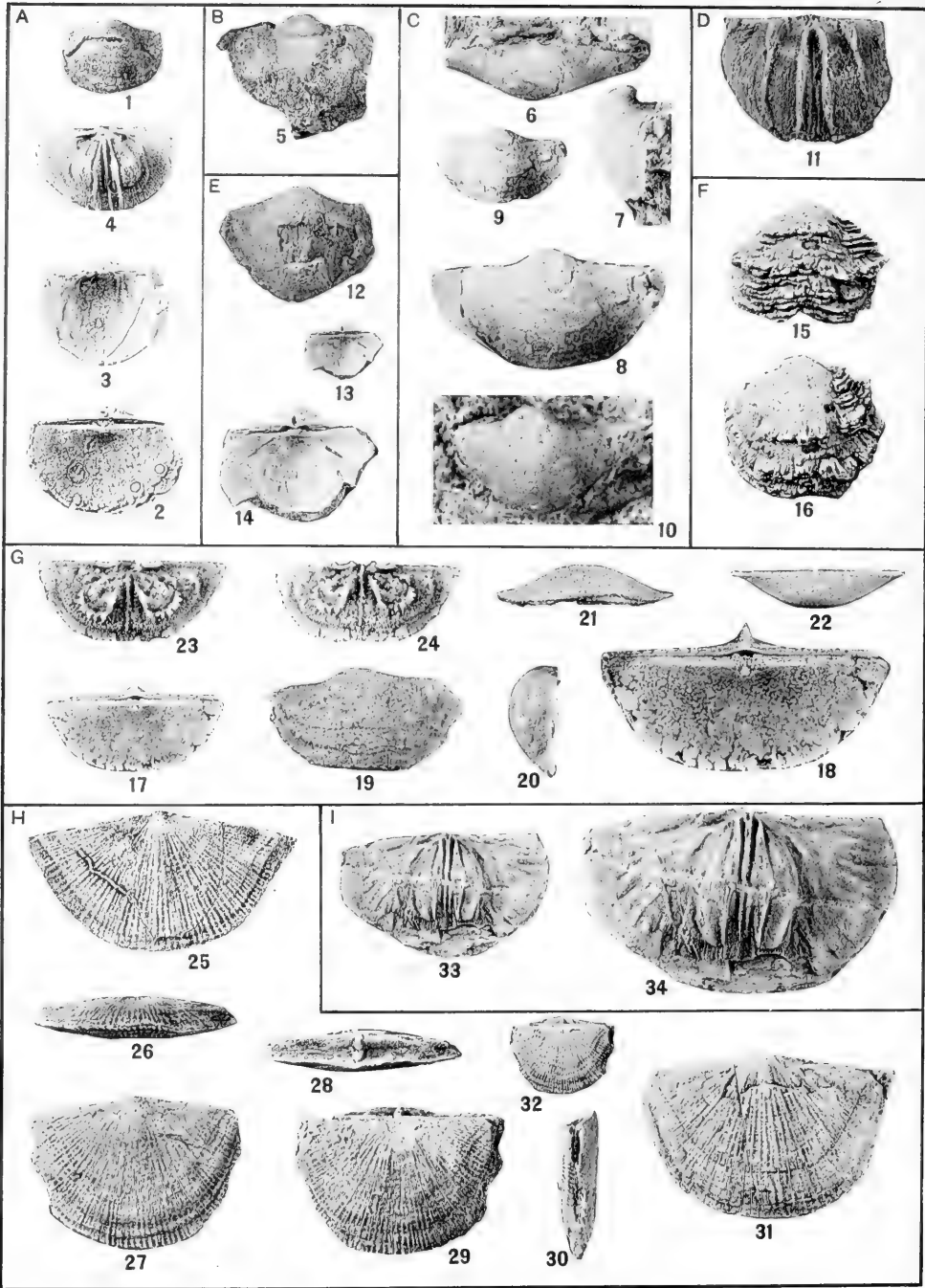


EOPLECTODONTA, LEPTAENA  
(SEE EXPLANATION OF PLATES.)

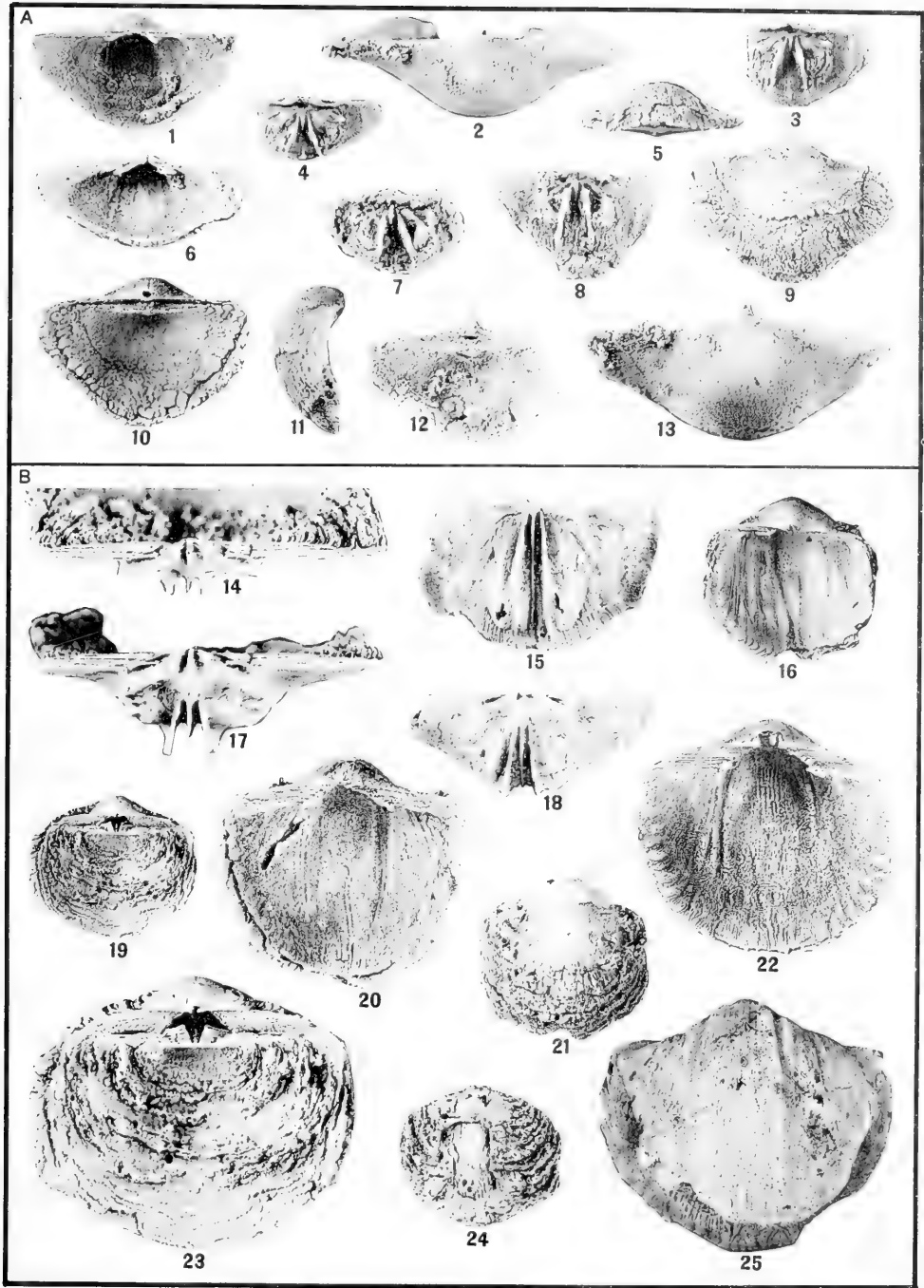


EOPLECTODONTA, GONIOTREMA, SOWERBYITES

(SEE EXPLANATION OF PLATES.)

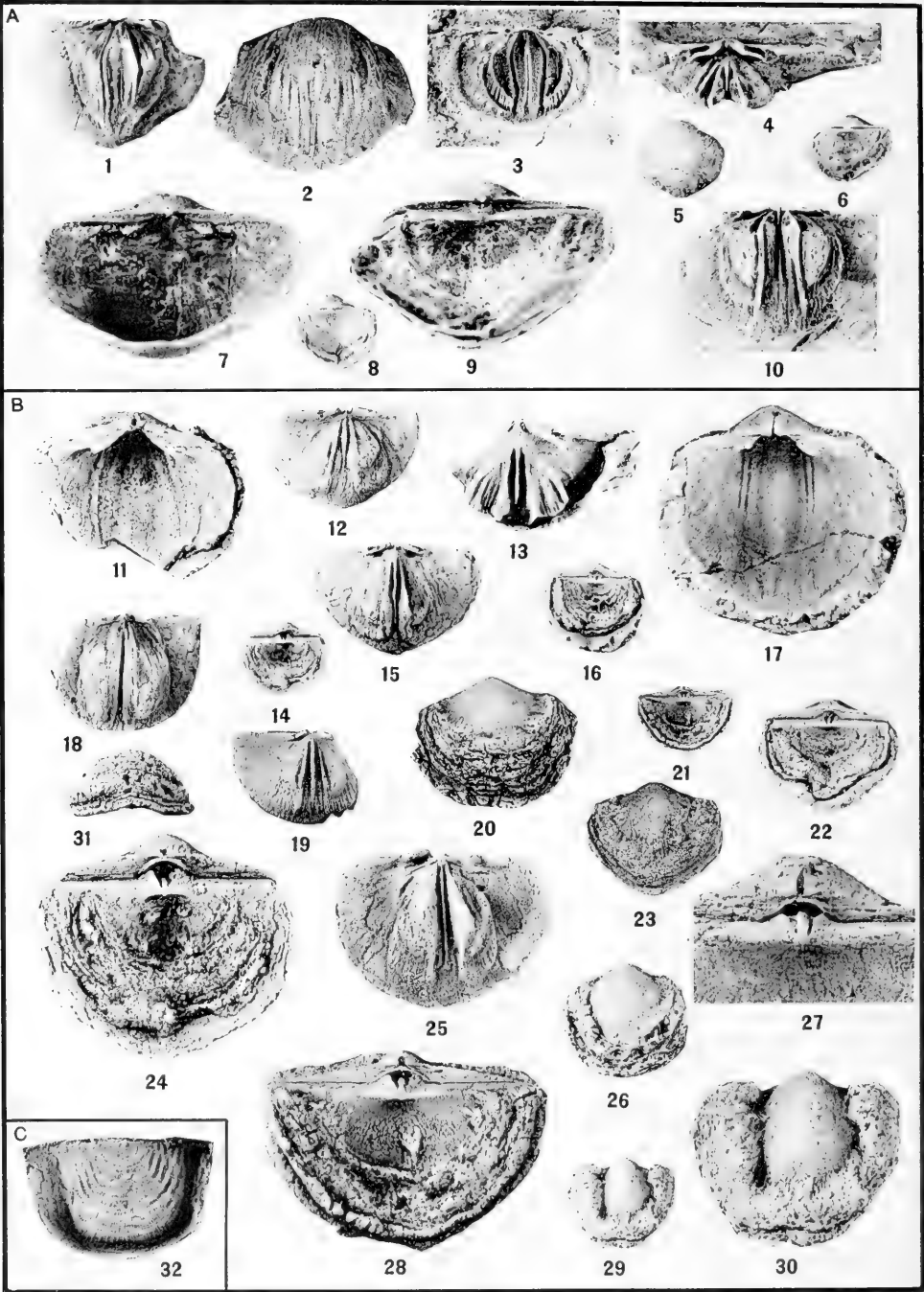


BIMURIA, CHRISTIANIA, ISOPHRAGMA  
(SEE EXPLANATION OF PLATES.)



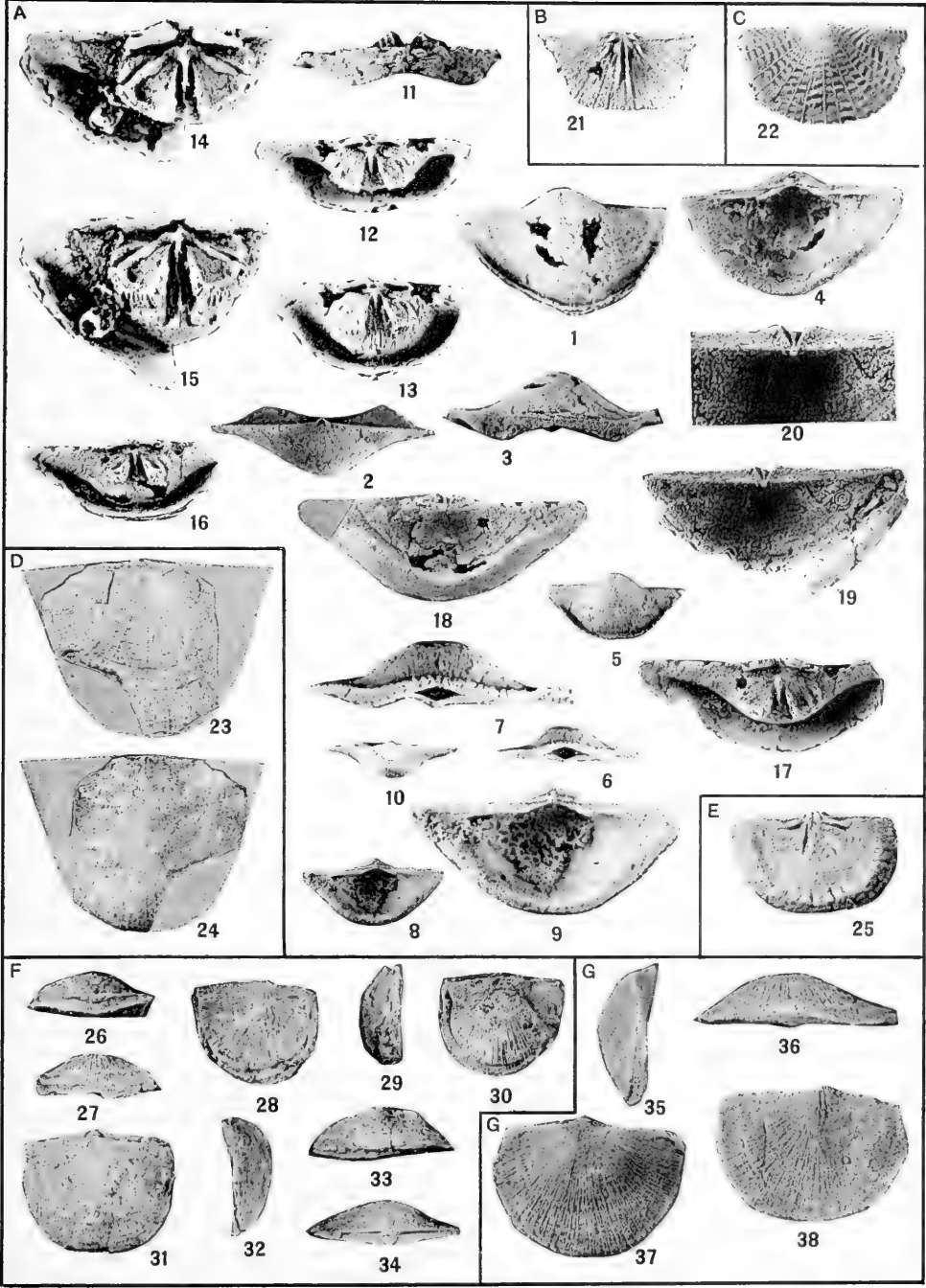
**BIMURIA**

(SEE EXPLANATION OF PLATES.)



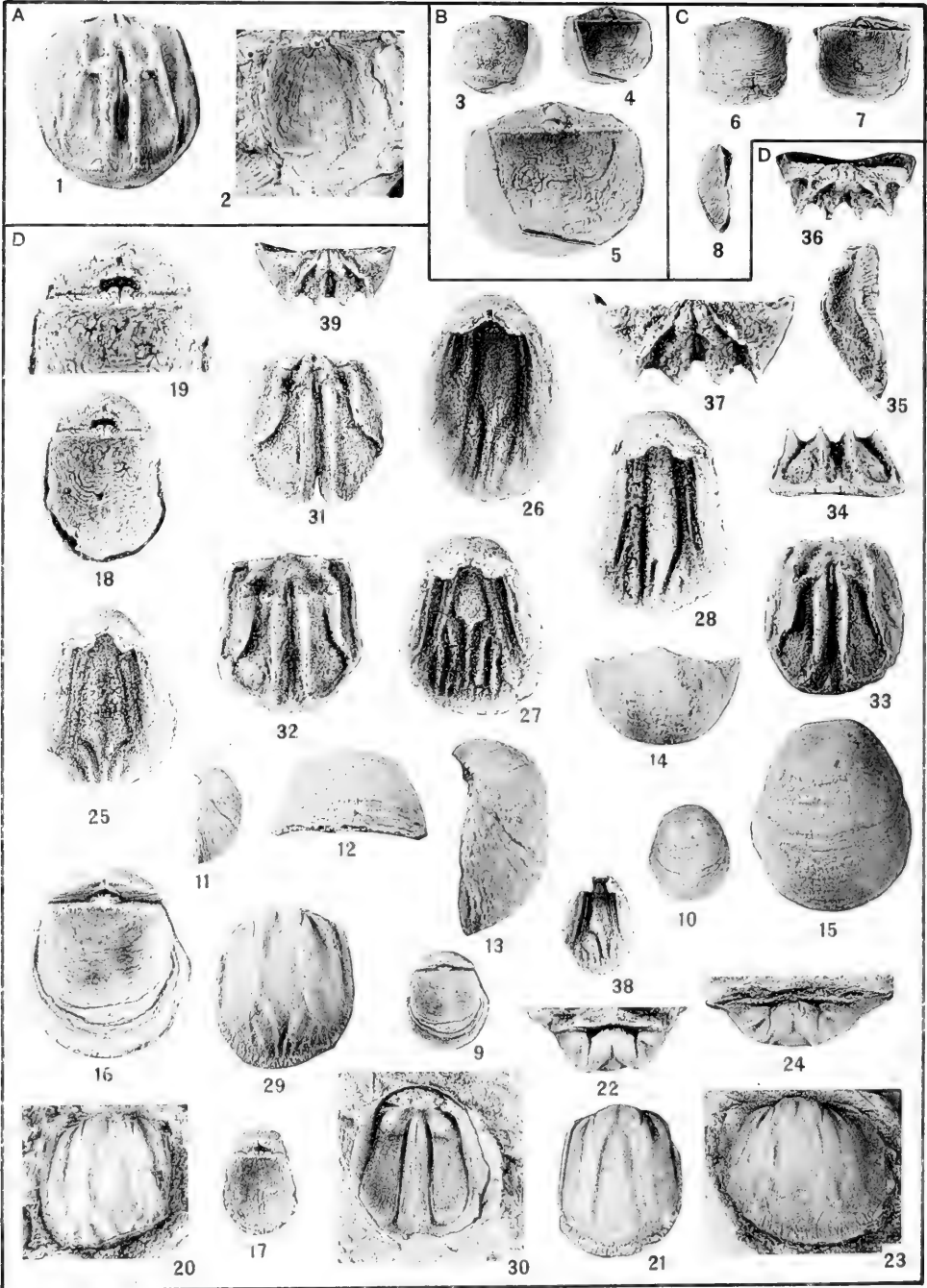
BIMURIA, LEPTAENA  
(SEE EXPLANATION OF PLATES.)





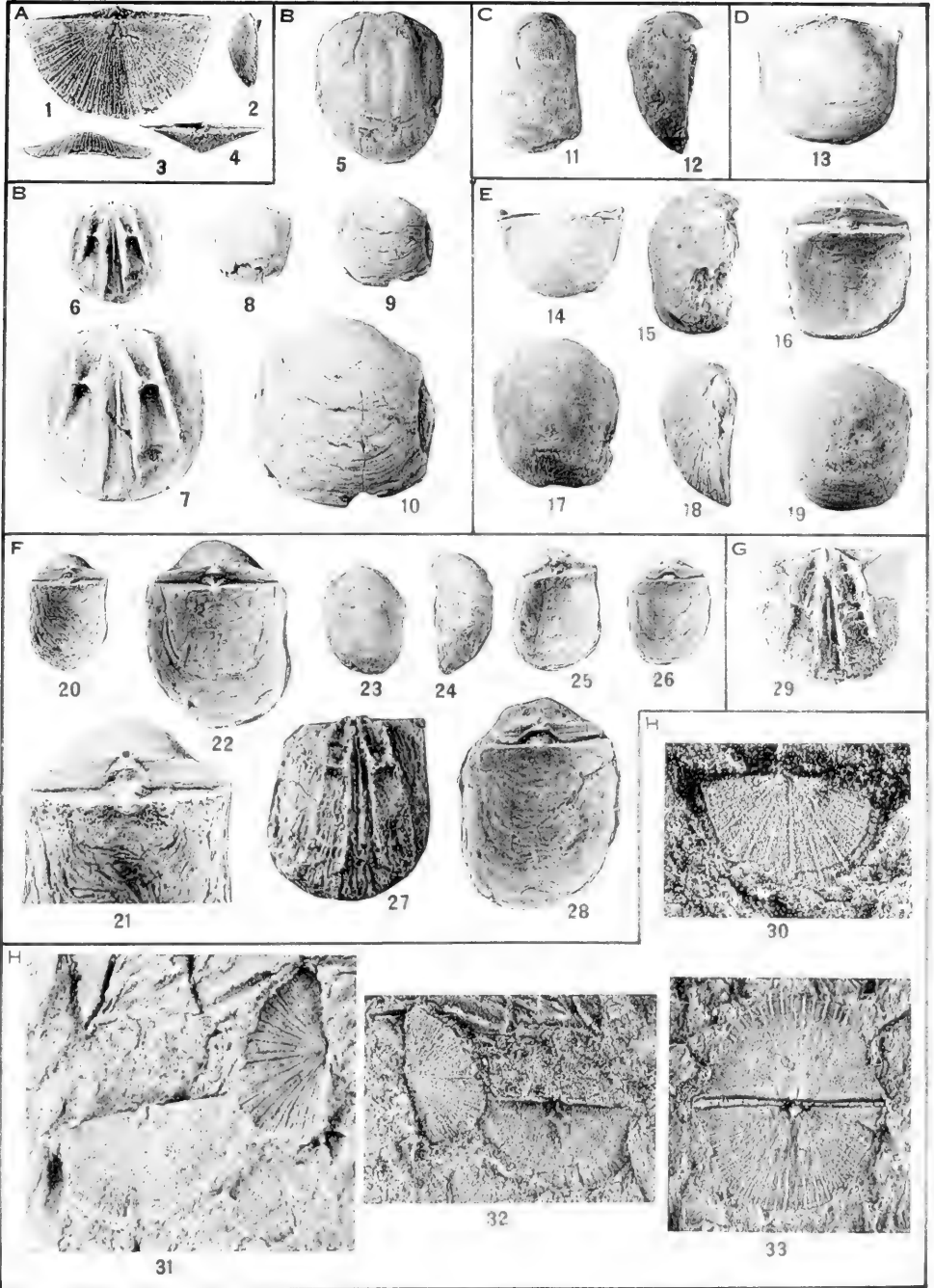
CRASPEDELIA, HESPERINIA, ISOPHRAGMA, PTYCHOGLYPTUS, RHIPIDOMENA, STROPHOMENA

(SEE EXPLANATION OF PLATES.)



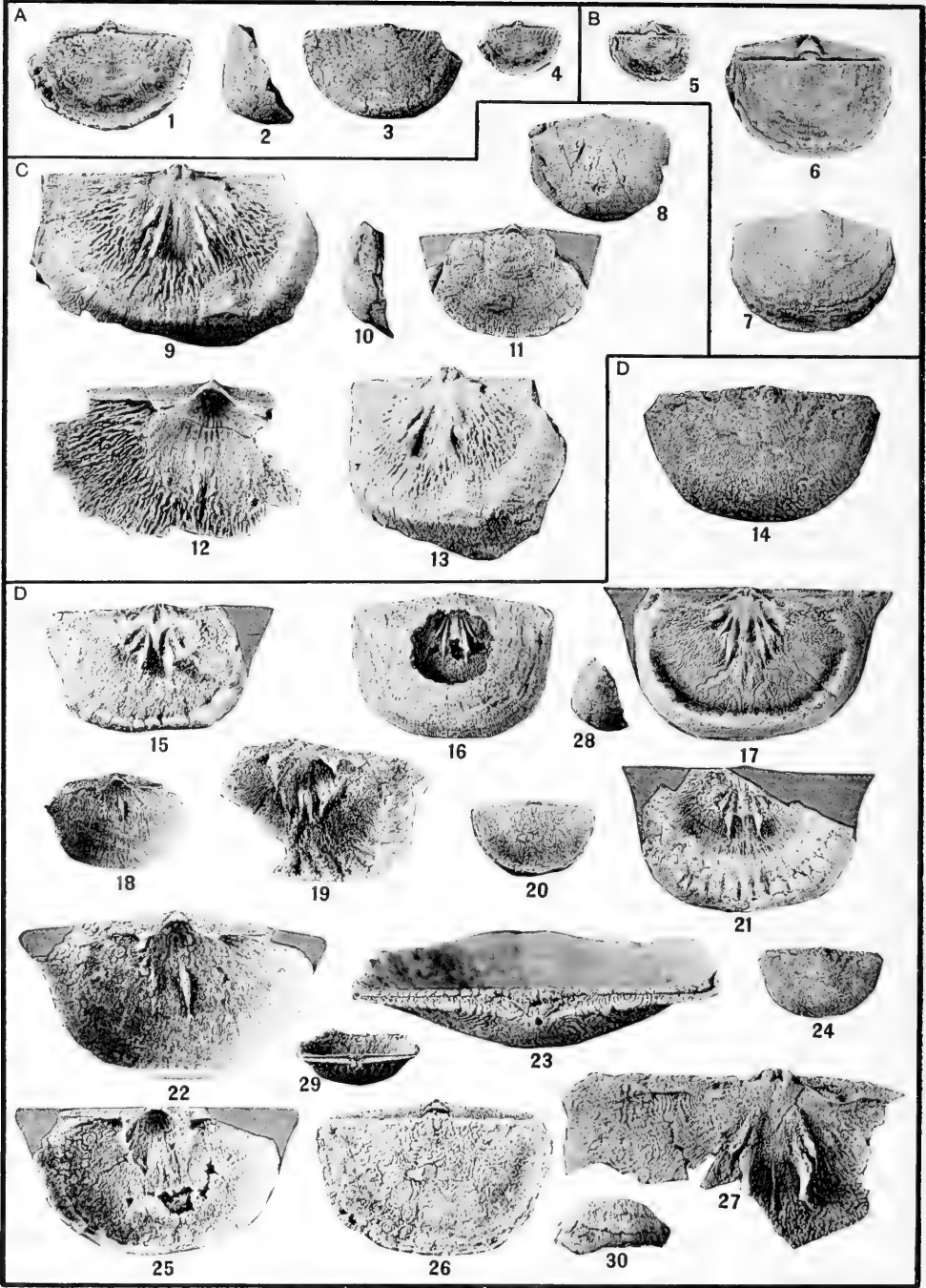
CHRISTIANIA

(SEE EXPLANATION OF PLATES.)



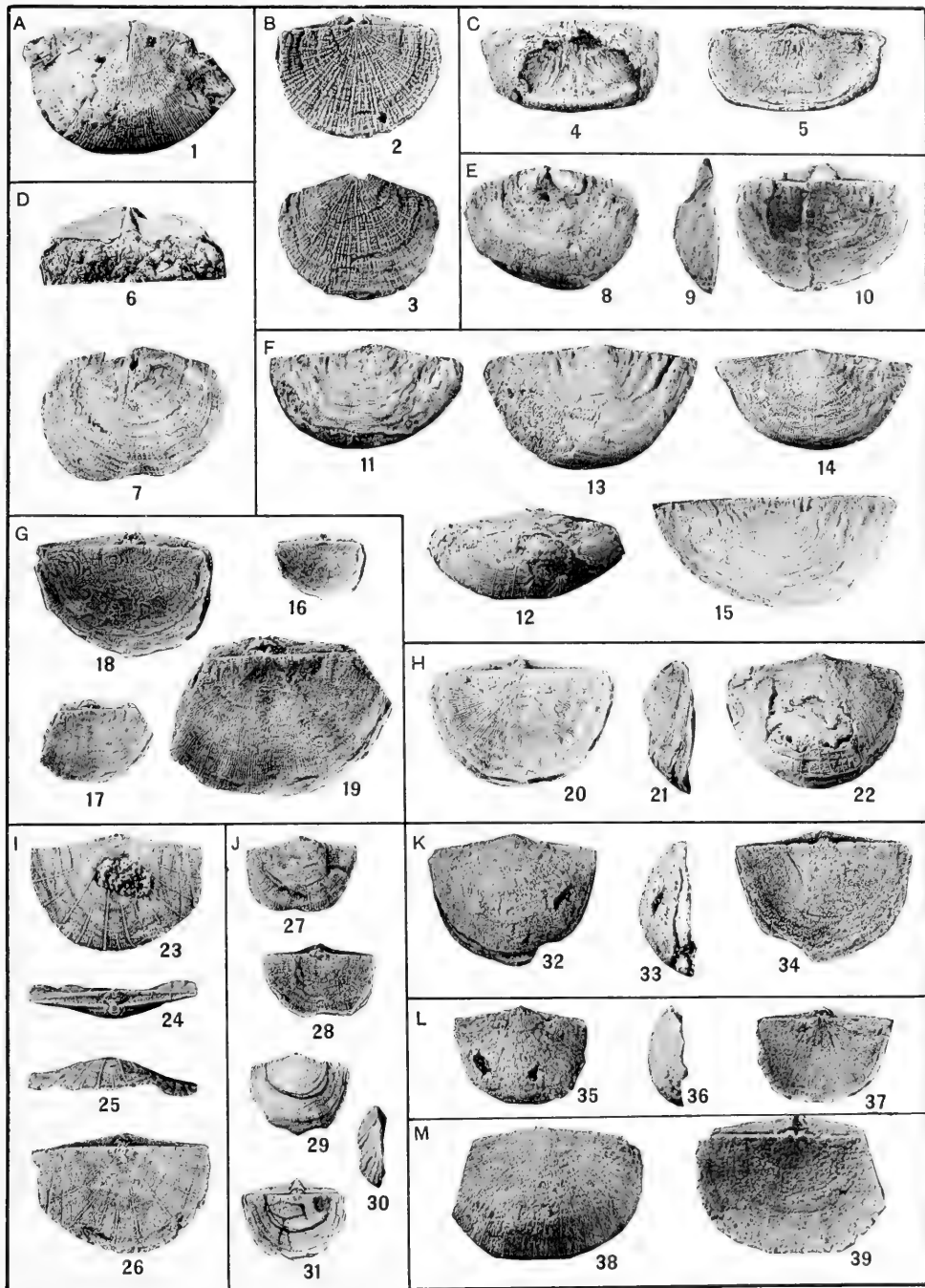
CHONETOIDEA, CHRISTIANA, SOWERBYELLA

(SEE EXPLANATION OF PLATES.)



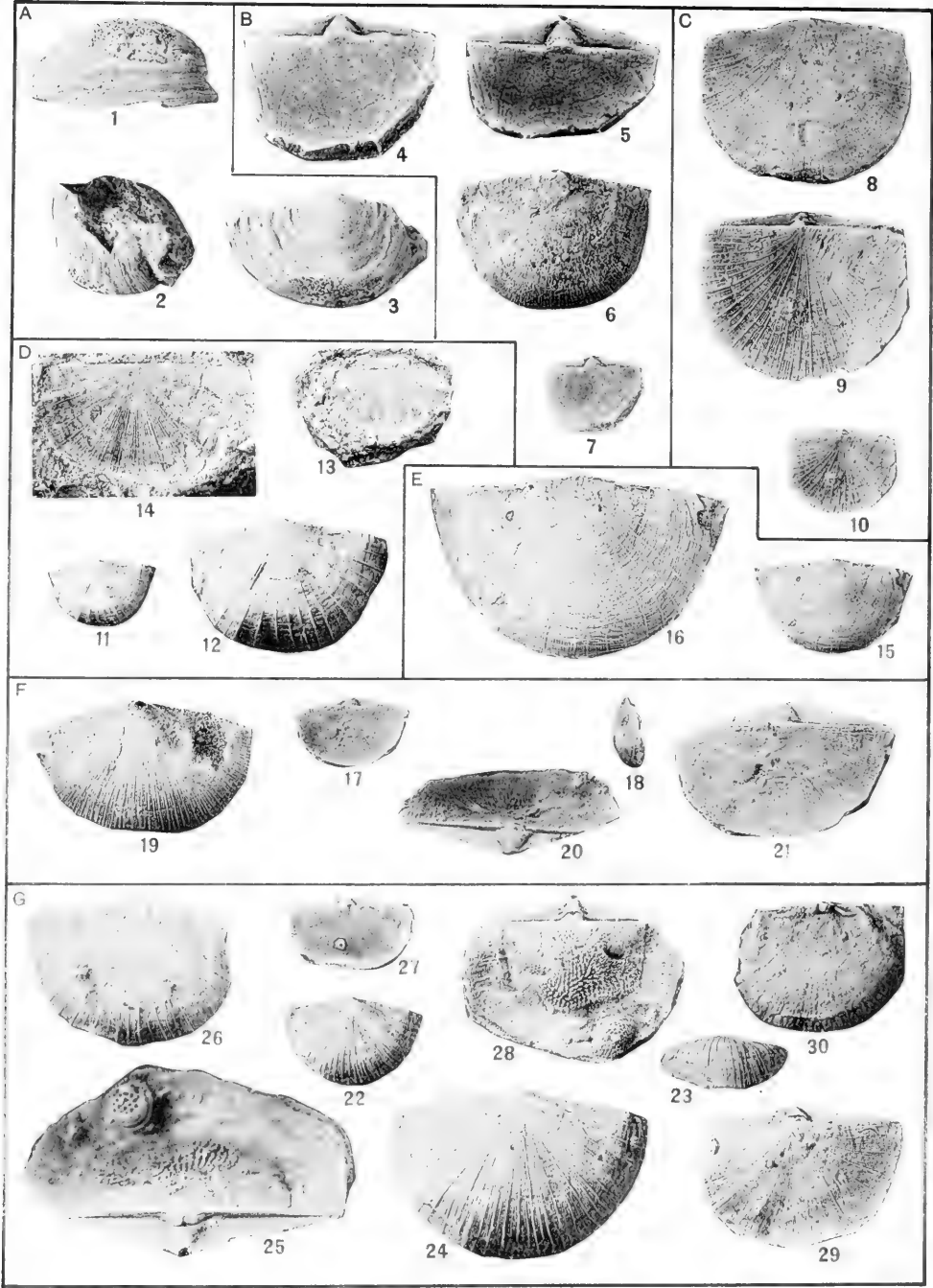
DACTYLOGONIA

(SEE EXPLANATION OF PLATES.)

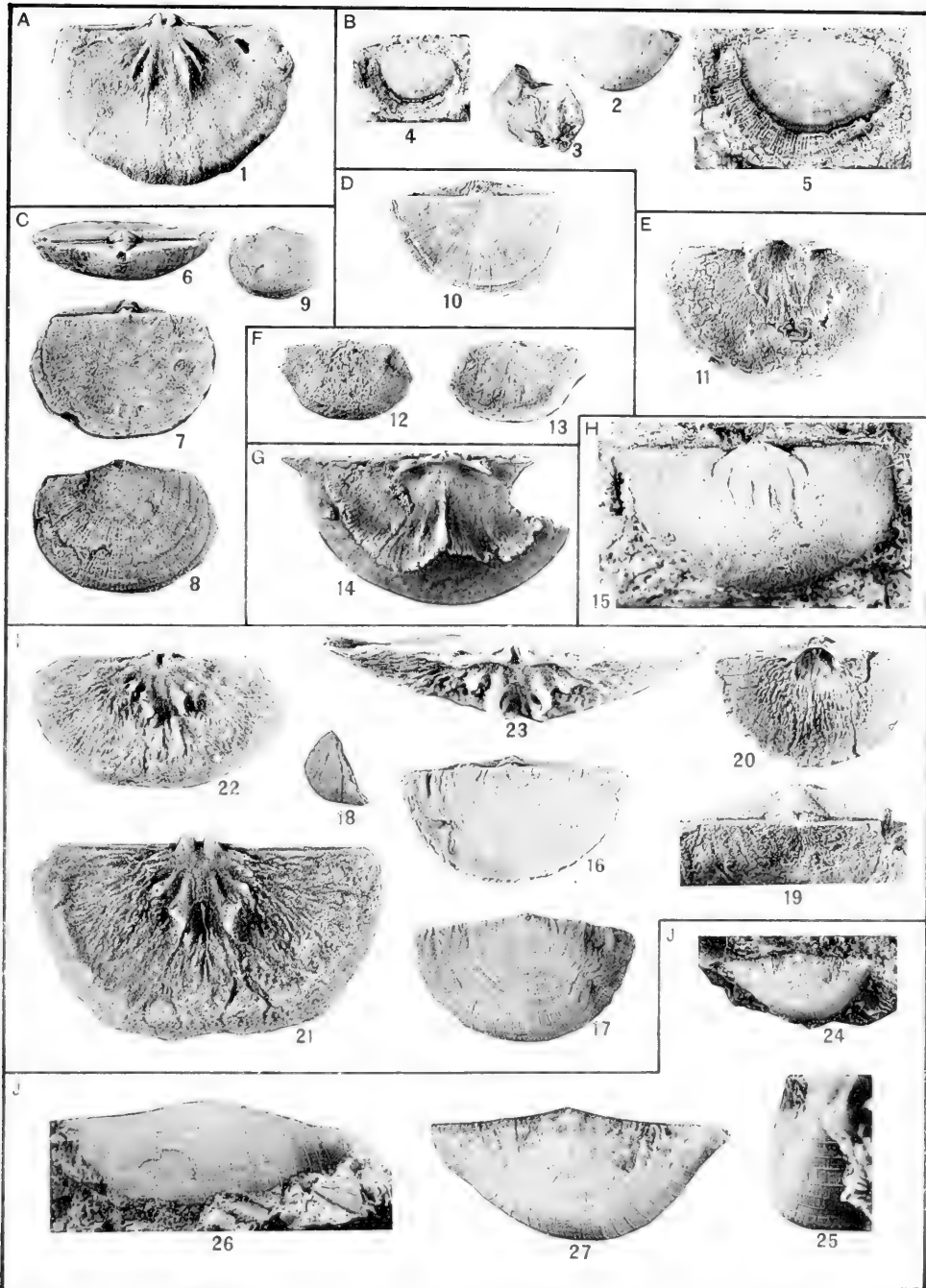


DACTYLOGONIA, MURINELLA GENUS AND SPECIES UNDET.

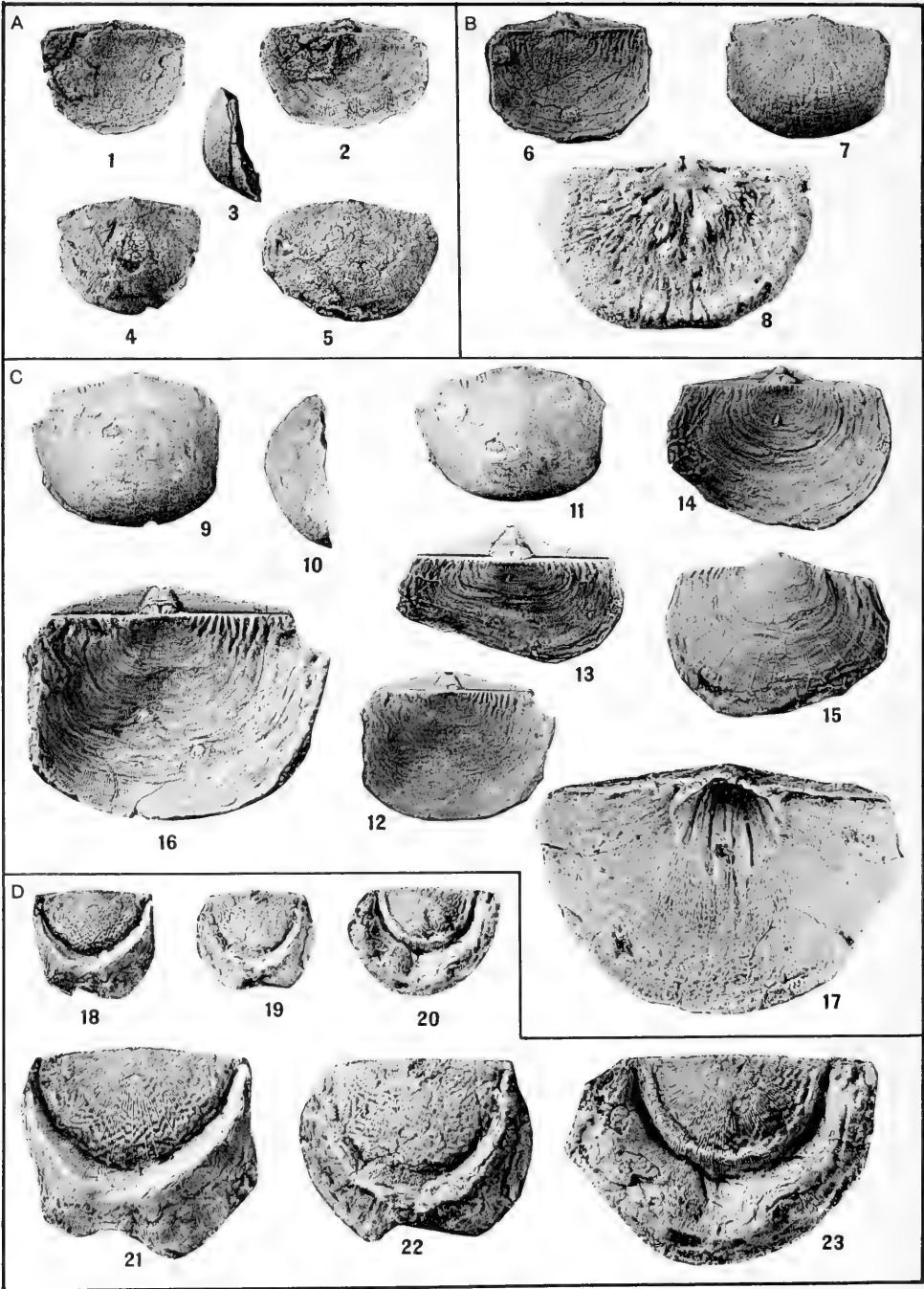
(SEE EXPLANATION OF PLATES.)



DACTYLOGONIA, RHIPIDOMENA  
(SEE EXPLANATION OF PLATES.)

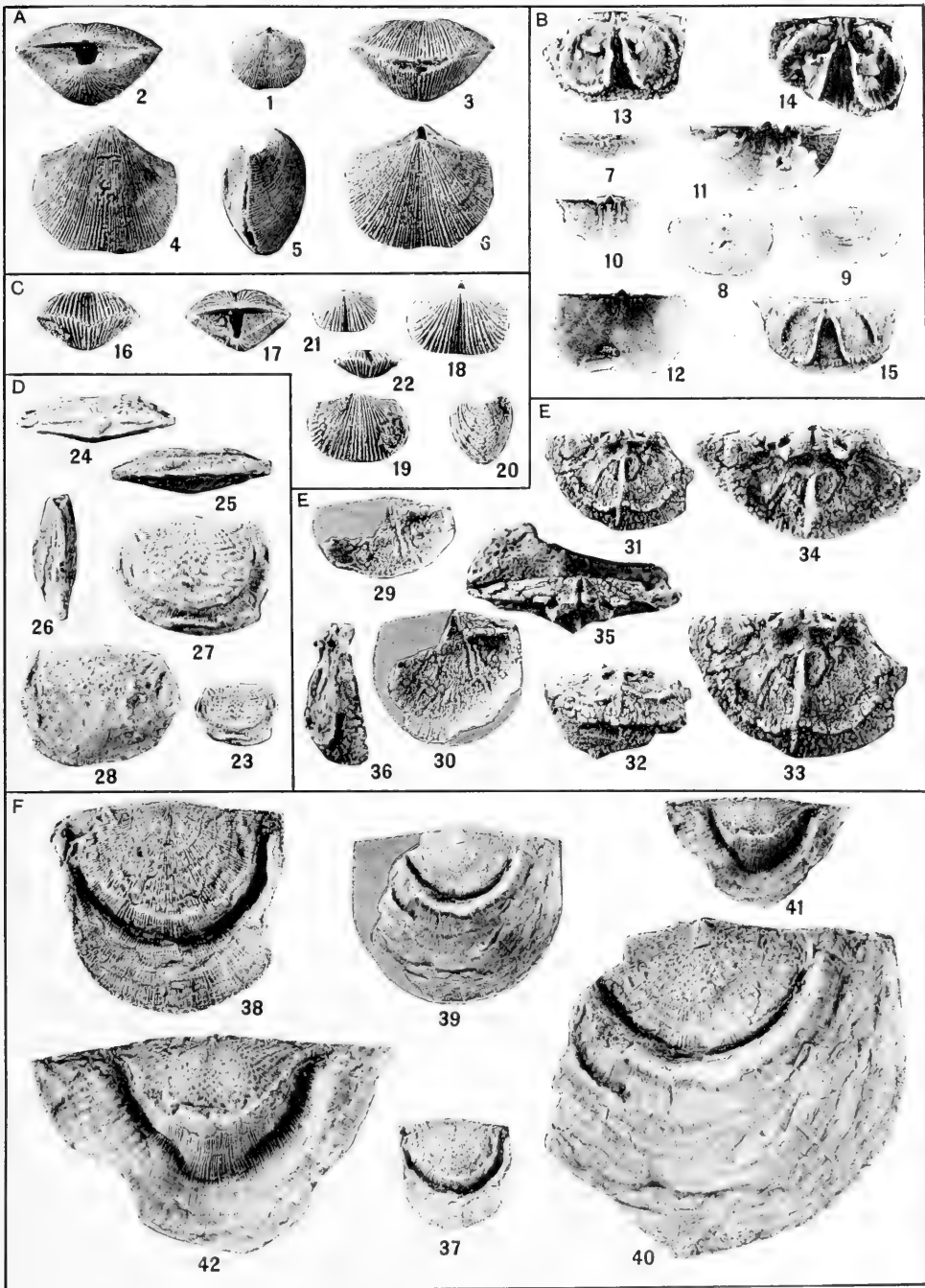


DACTYLOGONIA, LEPTELLINA  
(SEE EXPLANATION OF PLATES.)



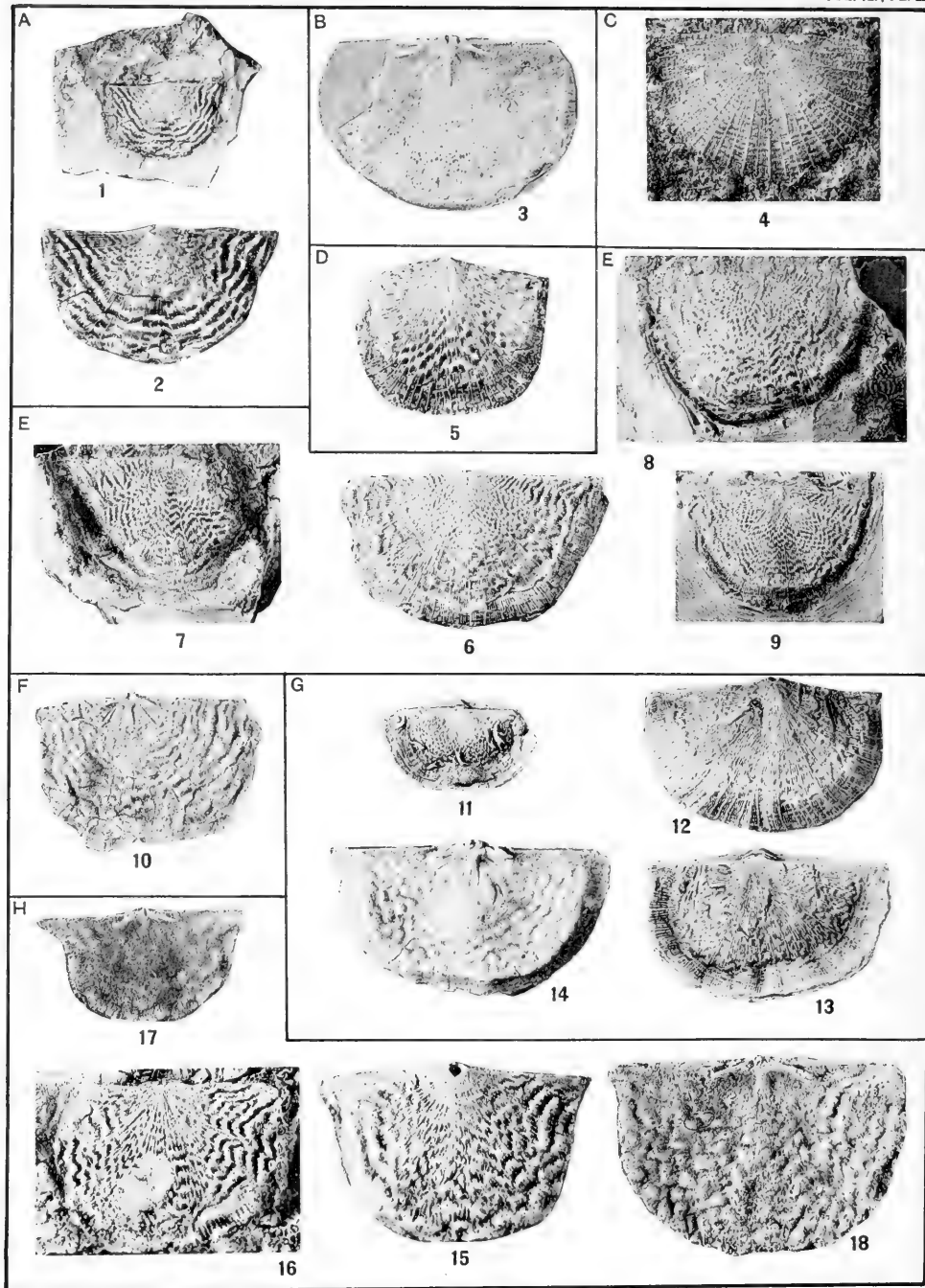
DACTYLOGONIA, LIMBIMURINA  
(SEE EXPLANATION OF PLATES.)



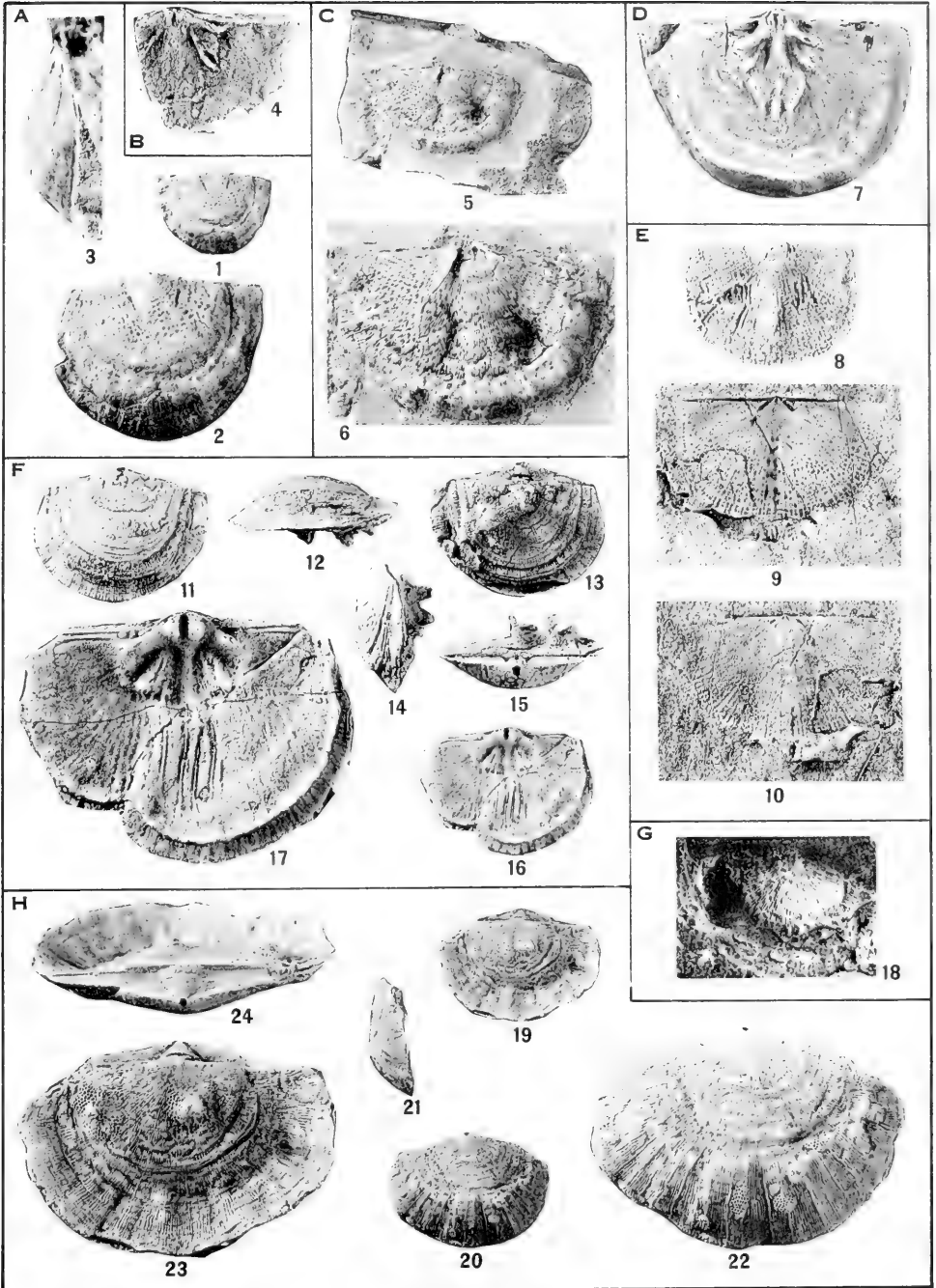


BELLIMURINA, CHRISTIANIA, LATOCRURA, LIMBIMURINA, PETRORIA,  
PHRAGMORTHIS

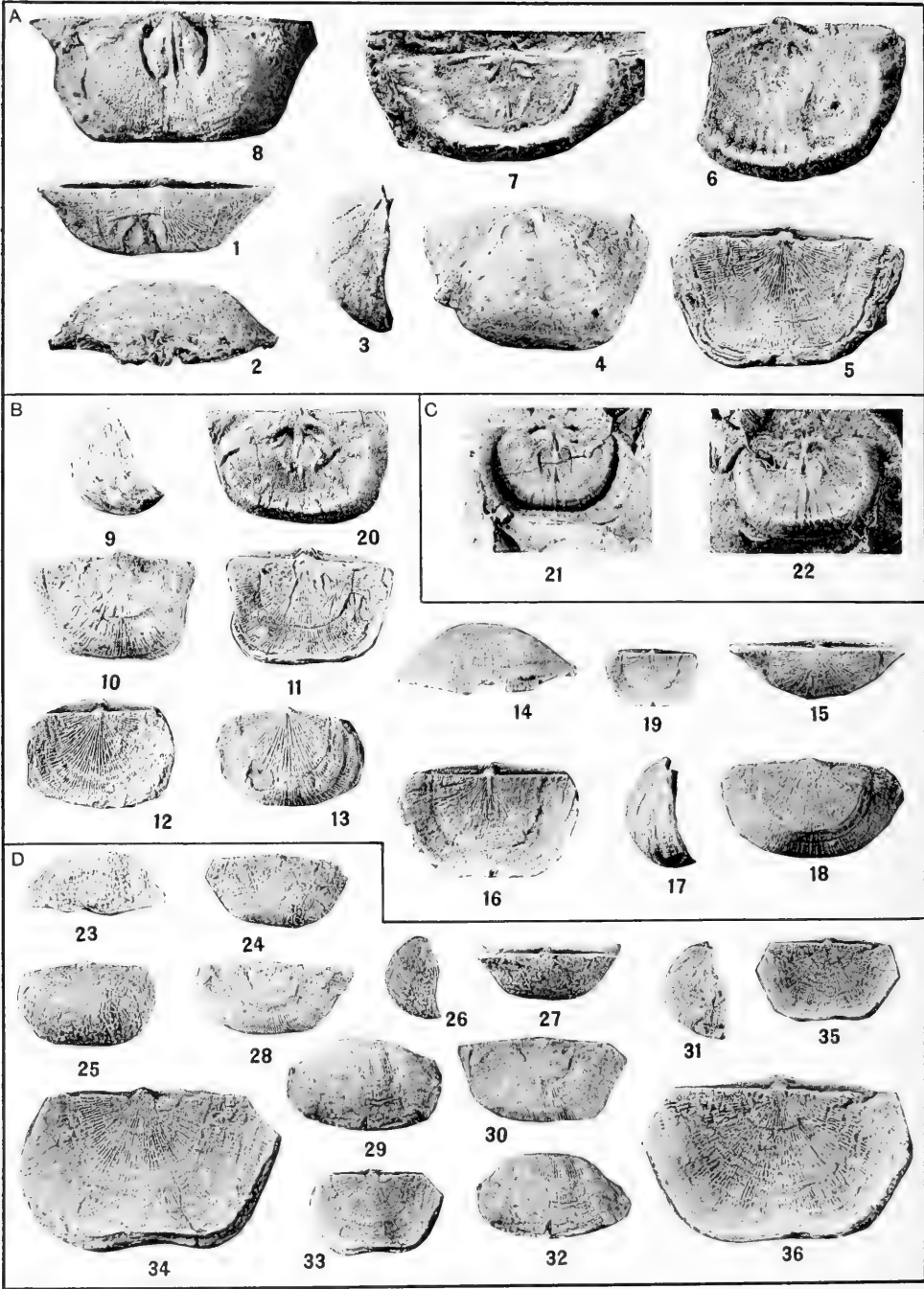
(SEE EXPLANATION OF PLATES.)



BELLIMURINA, LIMBIMURINA, STROPHOMENA  
(SEE EXPLANATION OF PLATES.)

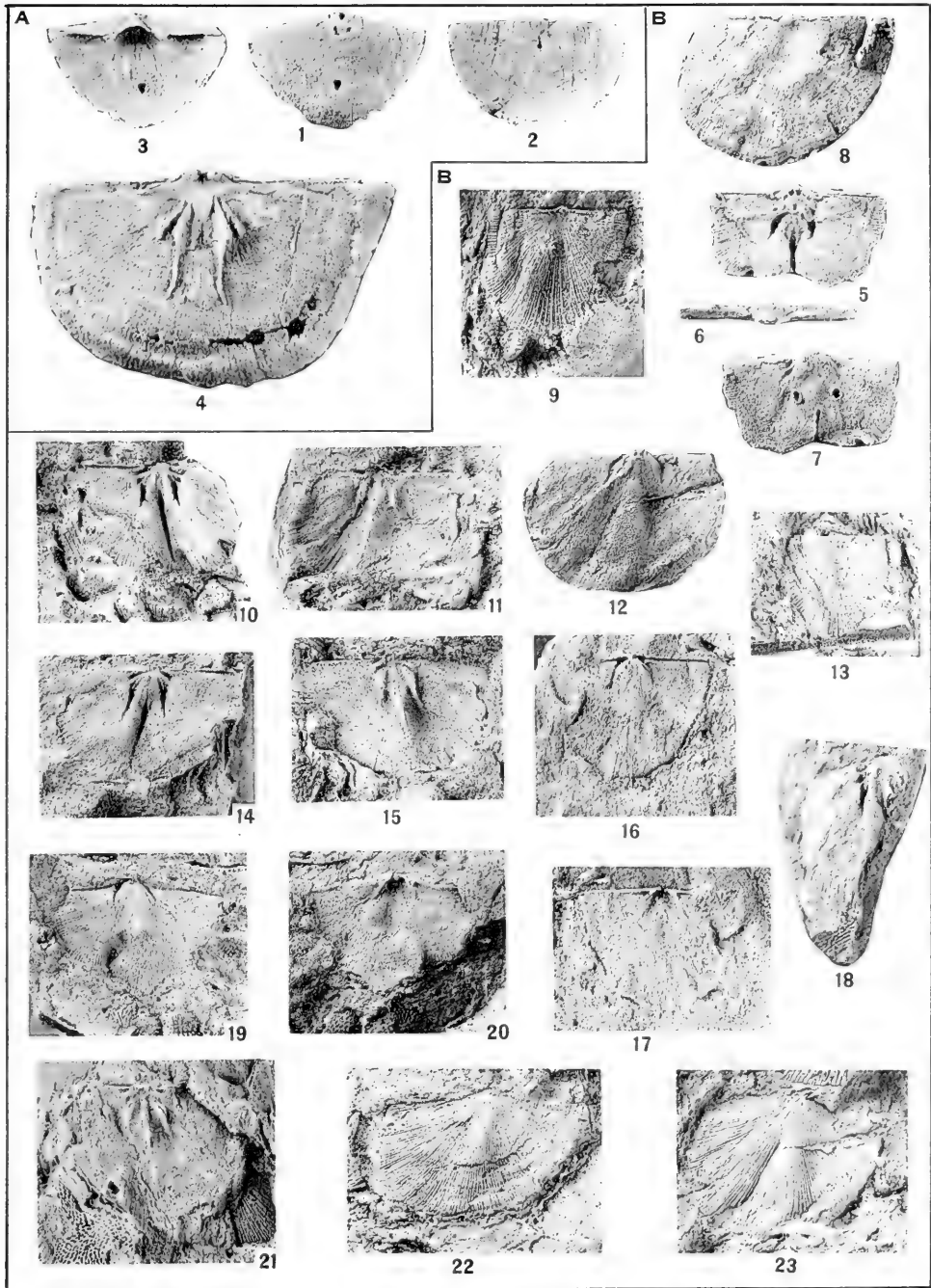


BELLIMURINA, CYPHOMENA, LIMBIMURINA, MURINELLA, PELONOMIA  
(SEE EXPLANATION OF PLATES.)

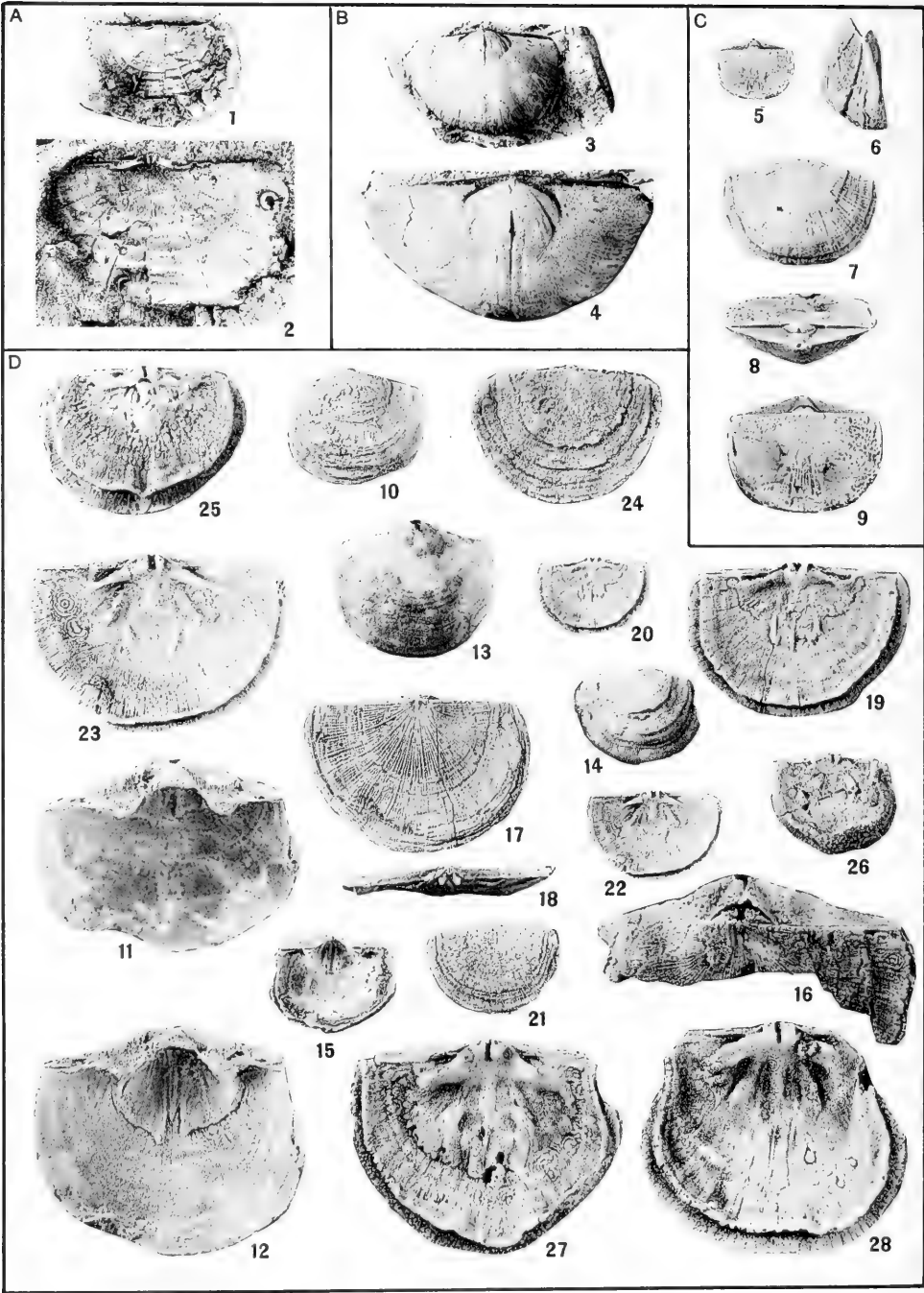


CYPHOMENA

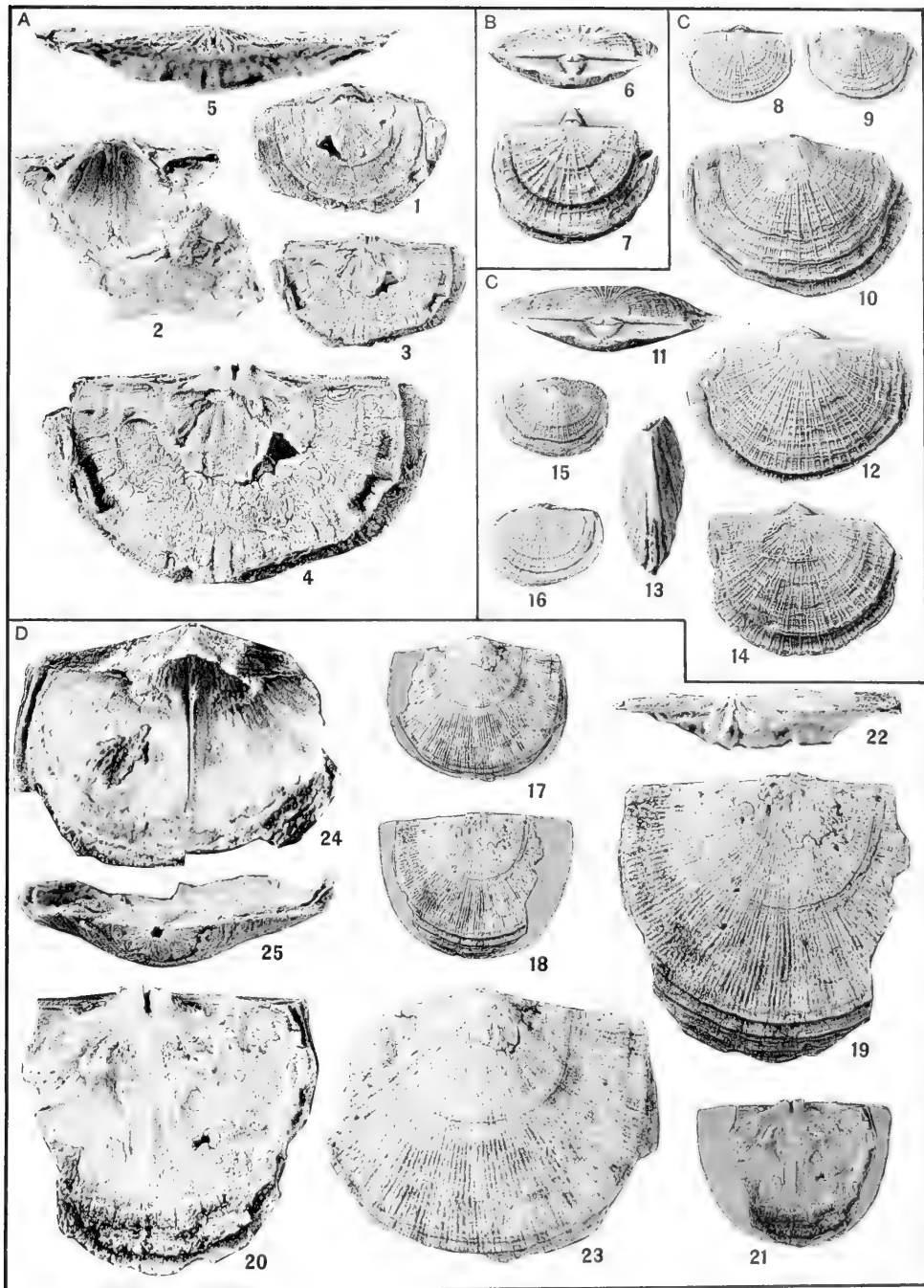
(SEE EXPLANATION OF PLATES.)



DACTYLOGONIA, TERATELASMA  
 (SEE EXPLANATION OF PLATES.)

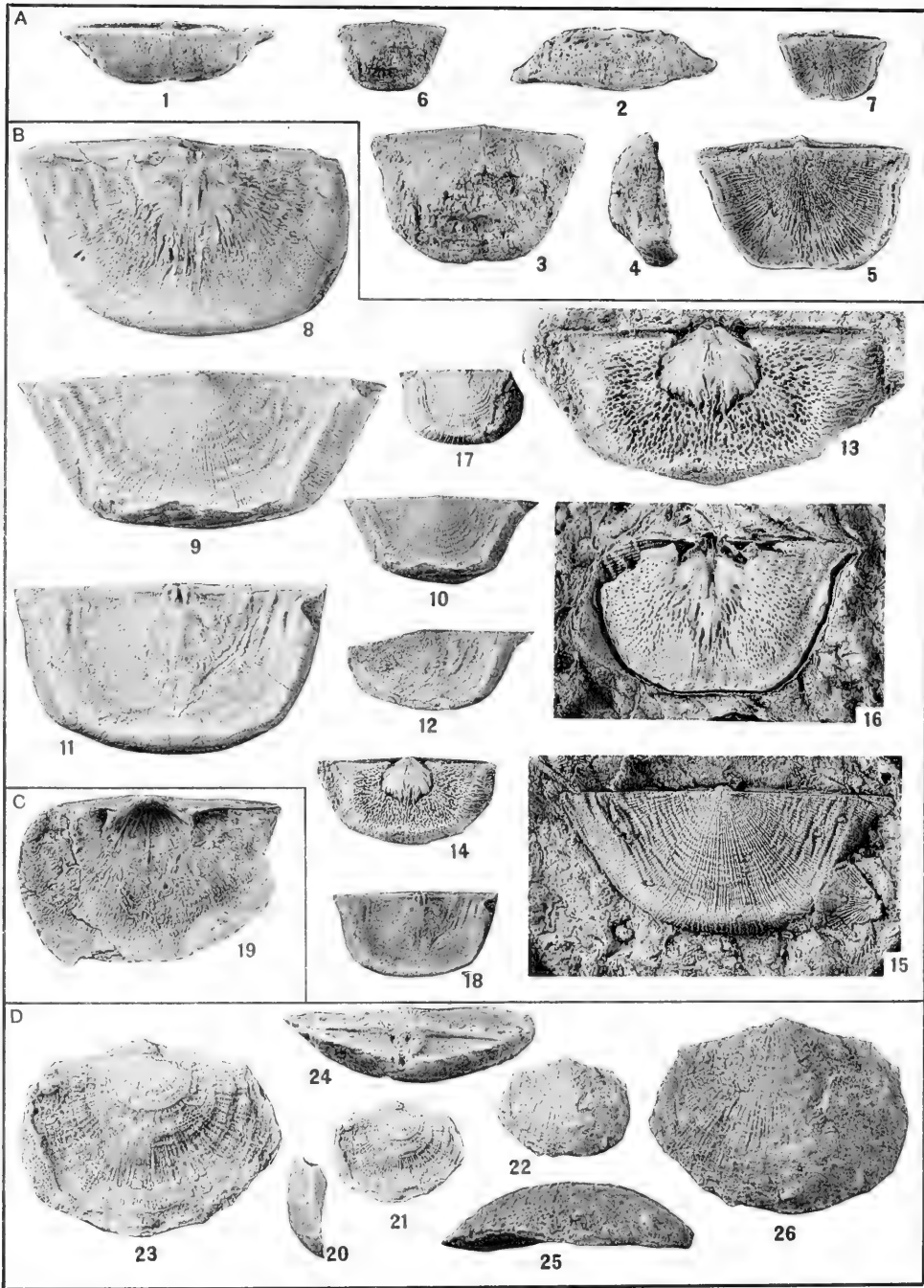


DACTYLOGONIA, MURINELLA  
(SEE EXPLANATION OF PLATES.)



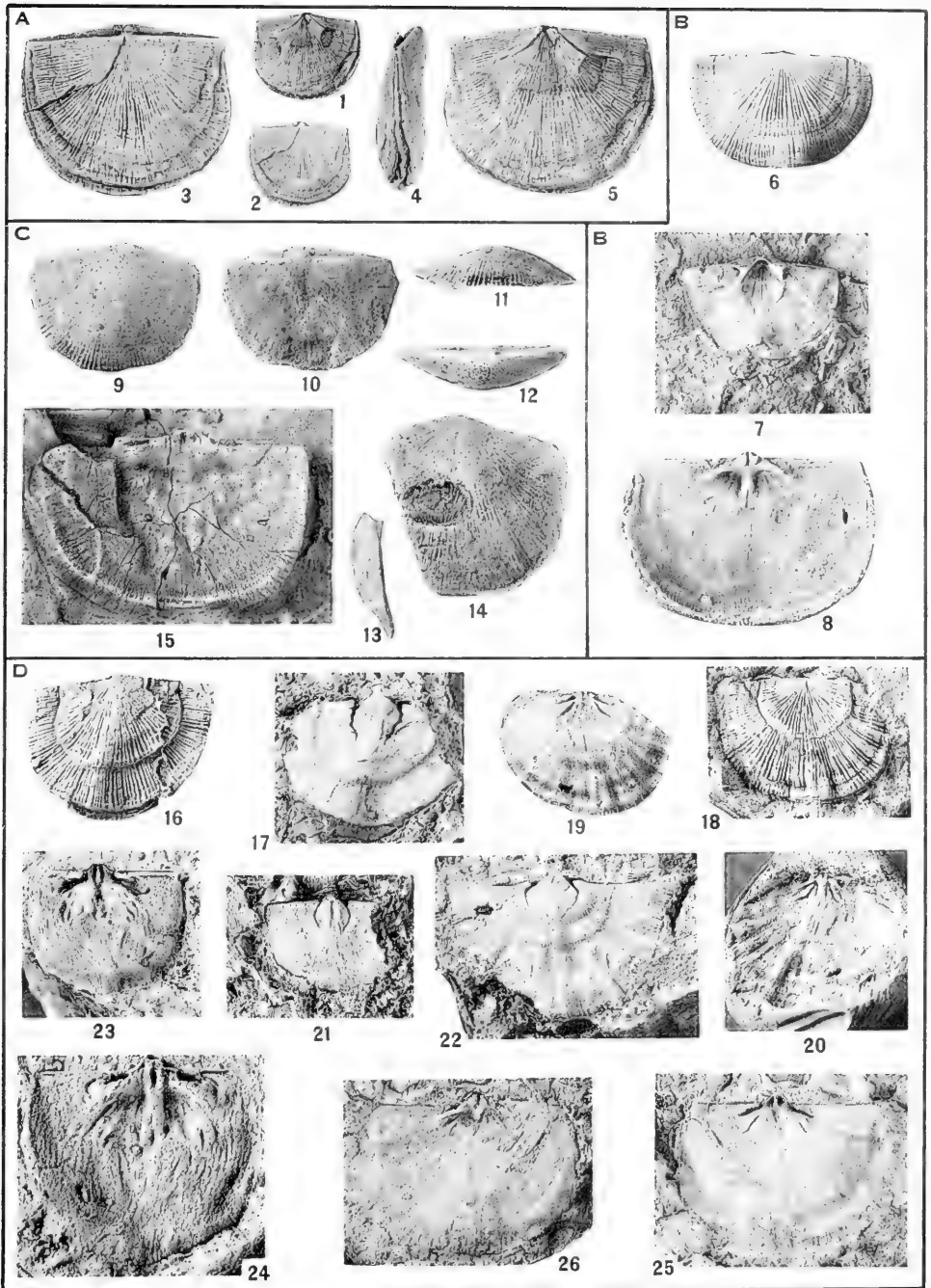
MURINELLA

(SEE EXPLANATION OF PLATES.)



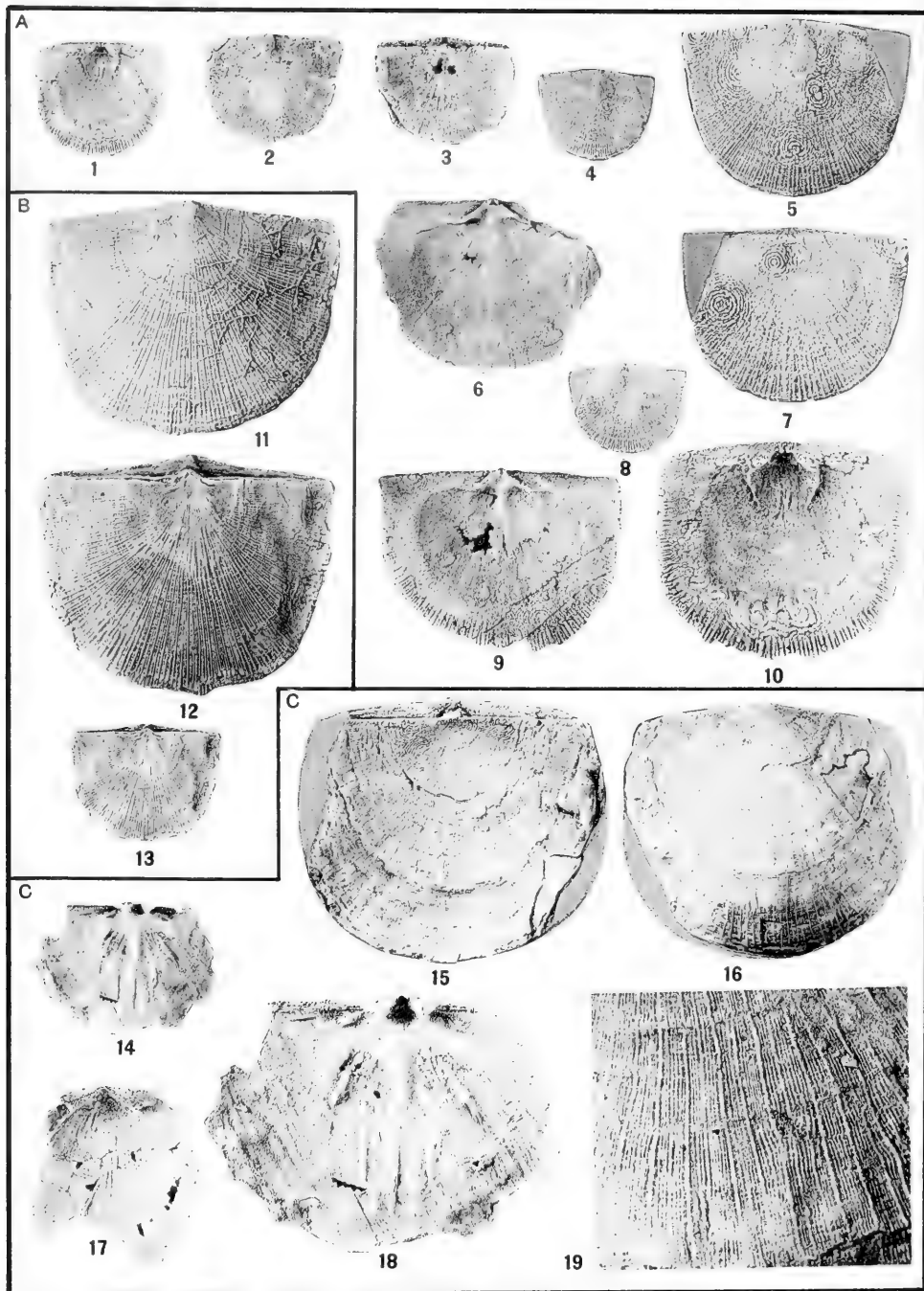
CYPHOMENA, DACTYLOGONIA, LEPTAENA, MURINELLA  
(SEE EXPLANATION OF PLATES.)





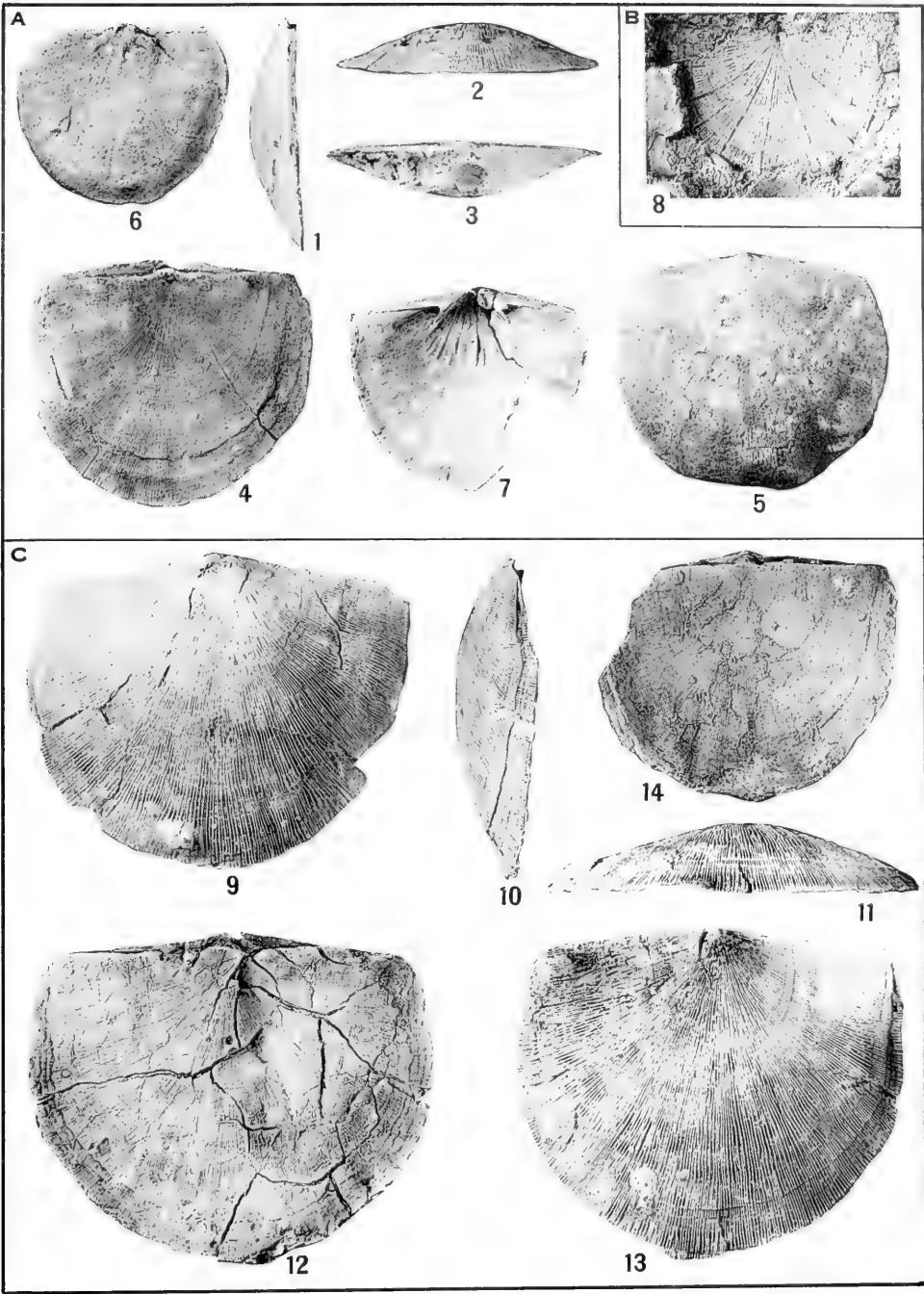
FURCITELLA, HESPERINIA, HOLTEDAHLINA

(SEE EXPLANATION OF PLATES.)

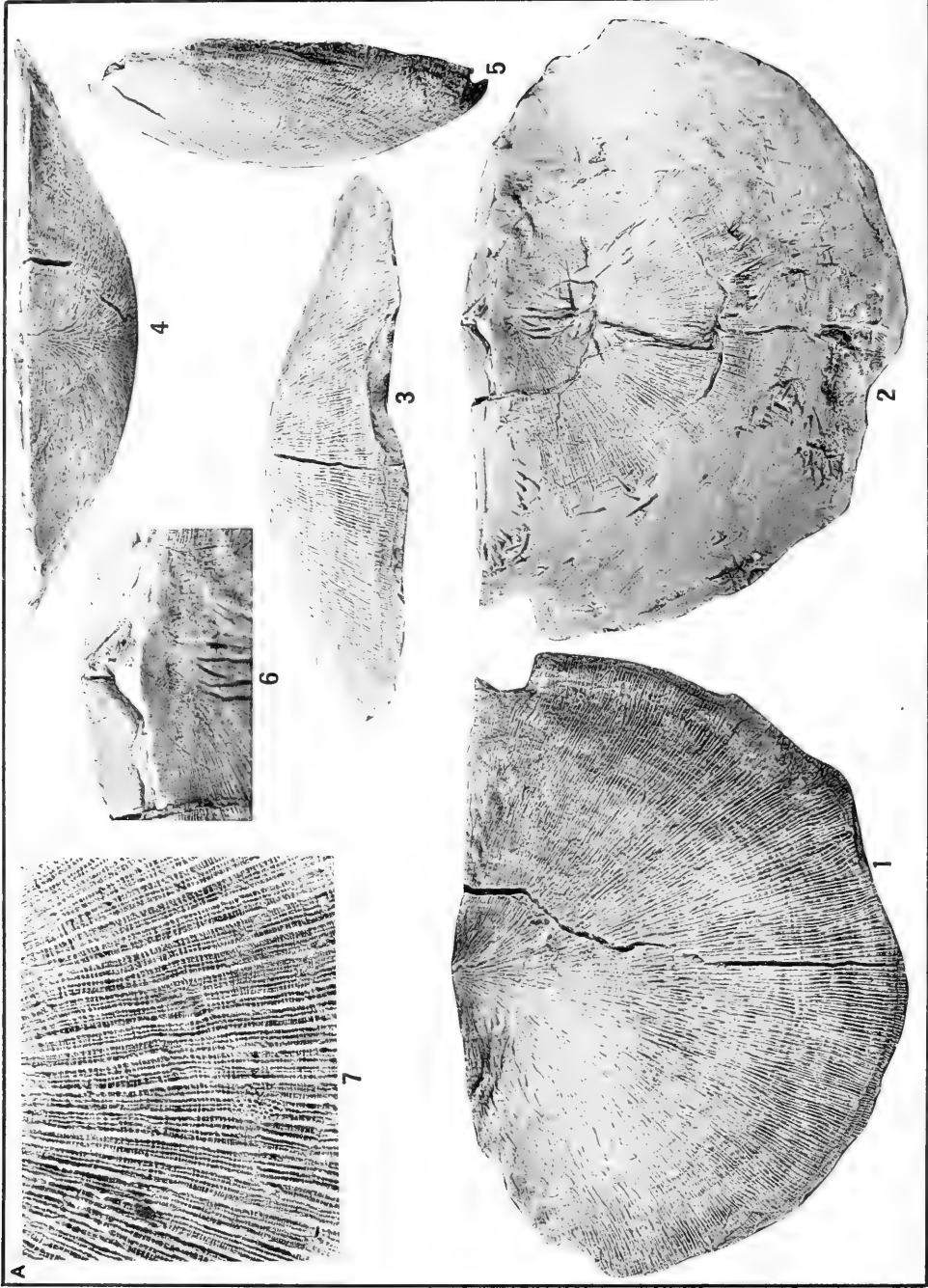


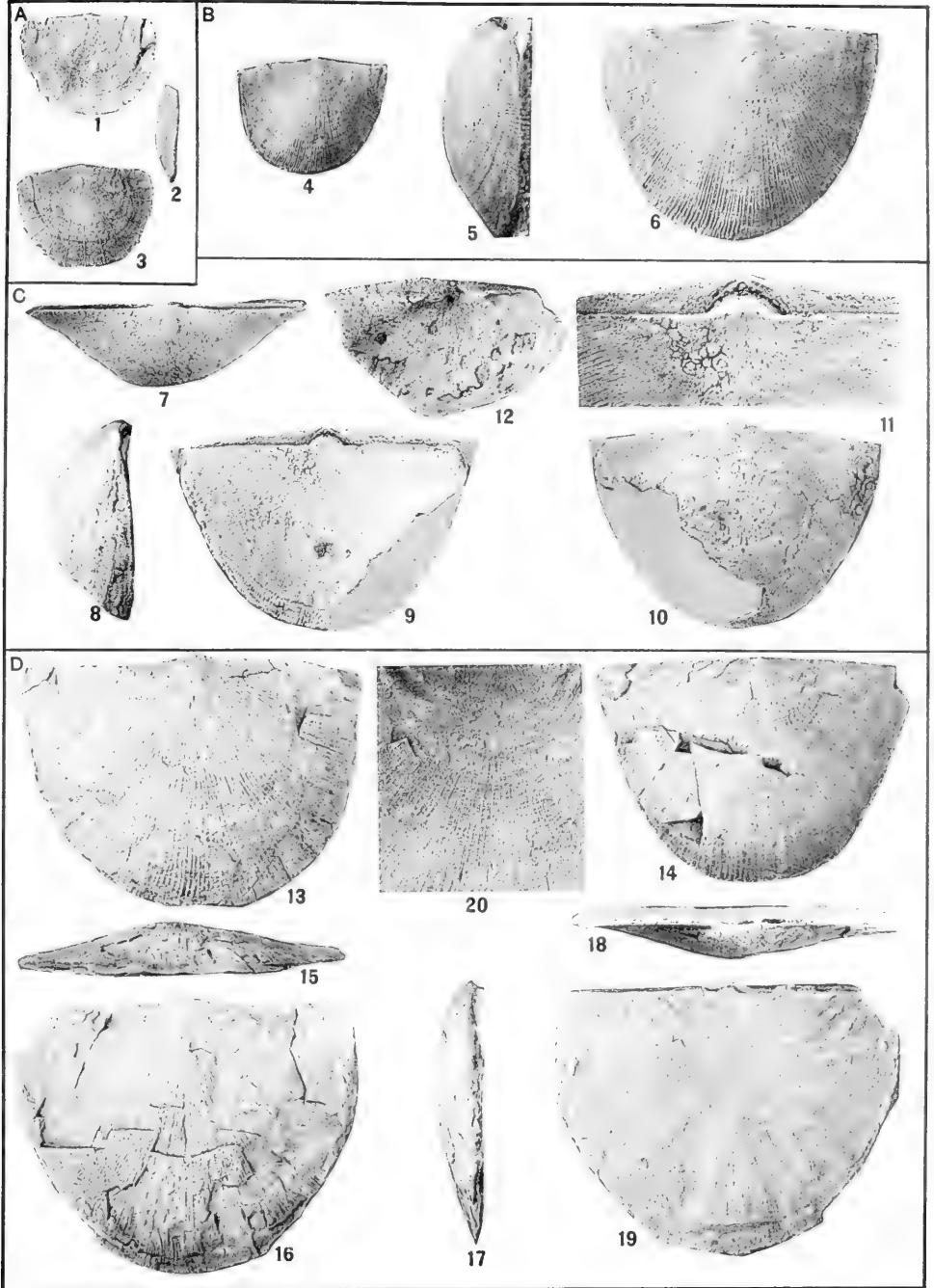
MACROCOELIA, PLATYMENA

(SEE EXPLANATION OF PLATES.)

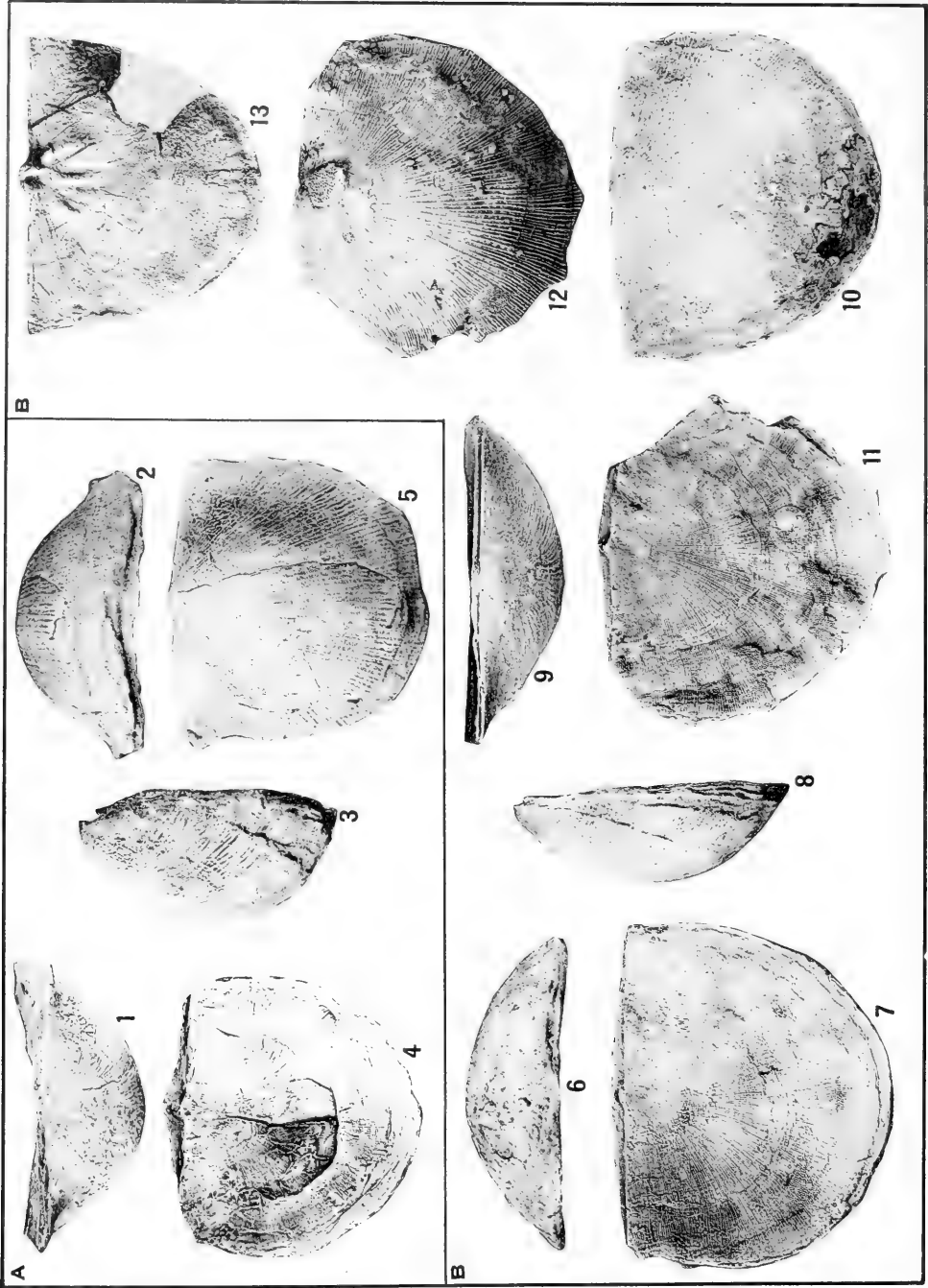


GLYPTOMENA, MACROCOELIA  
(SEE EXPLANATION OF PLATES.)

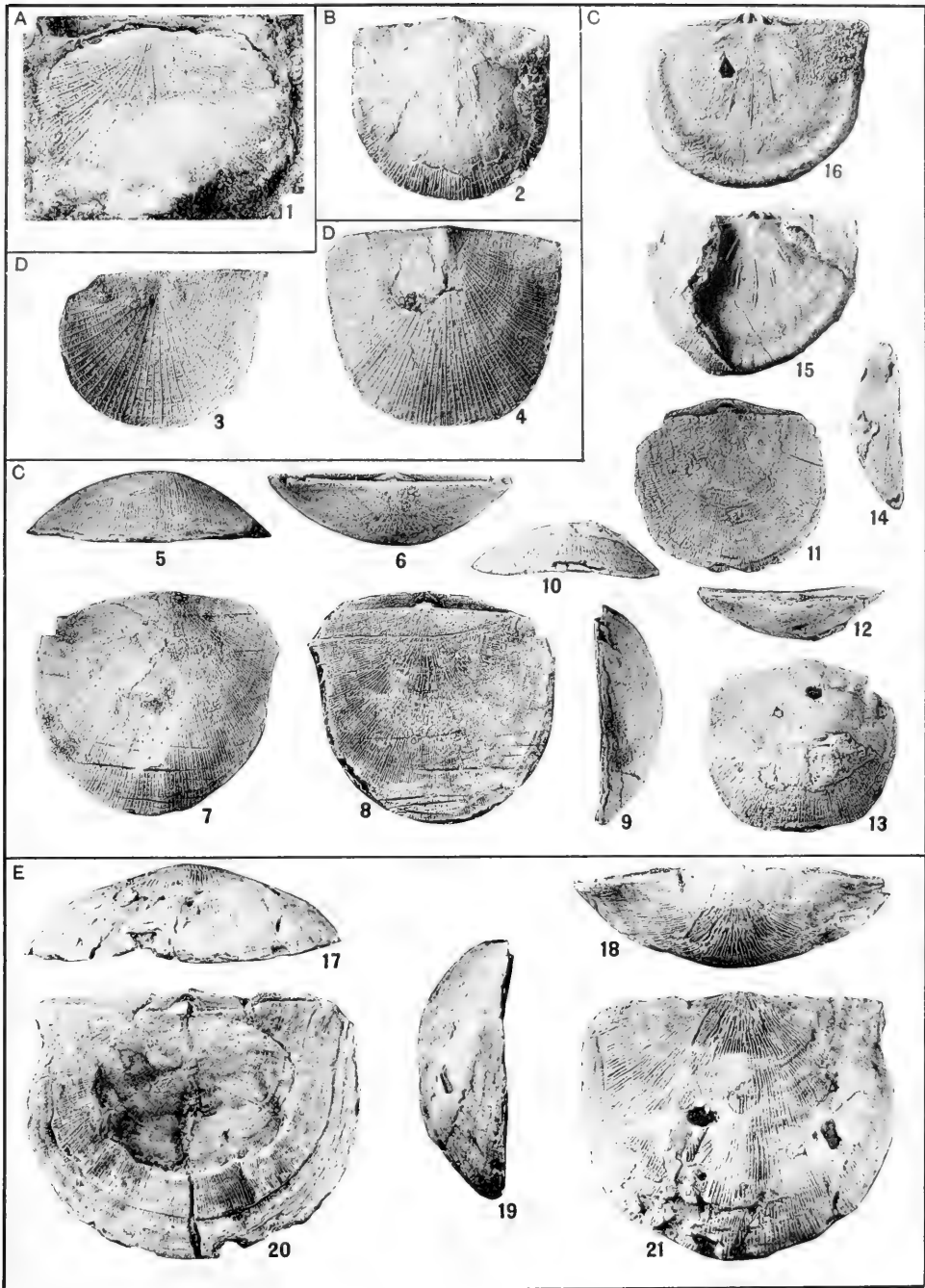




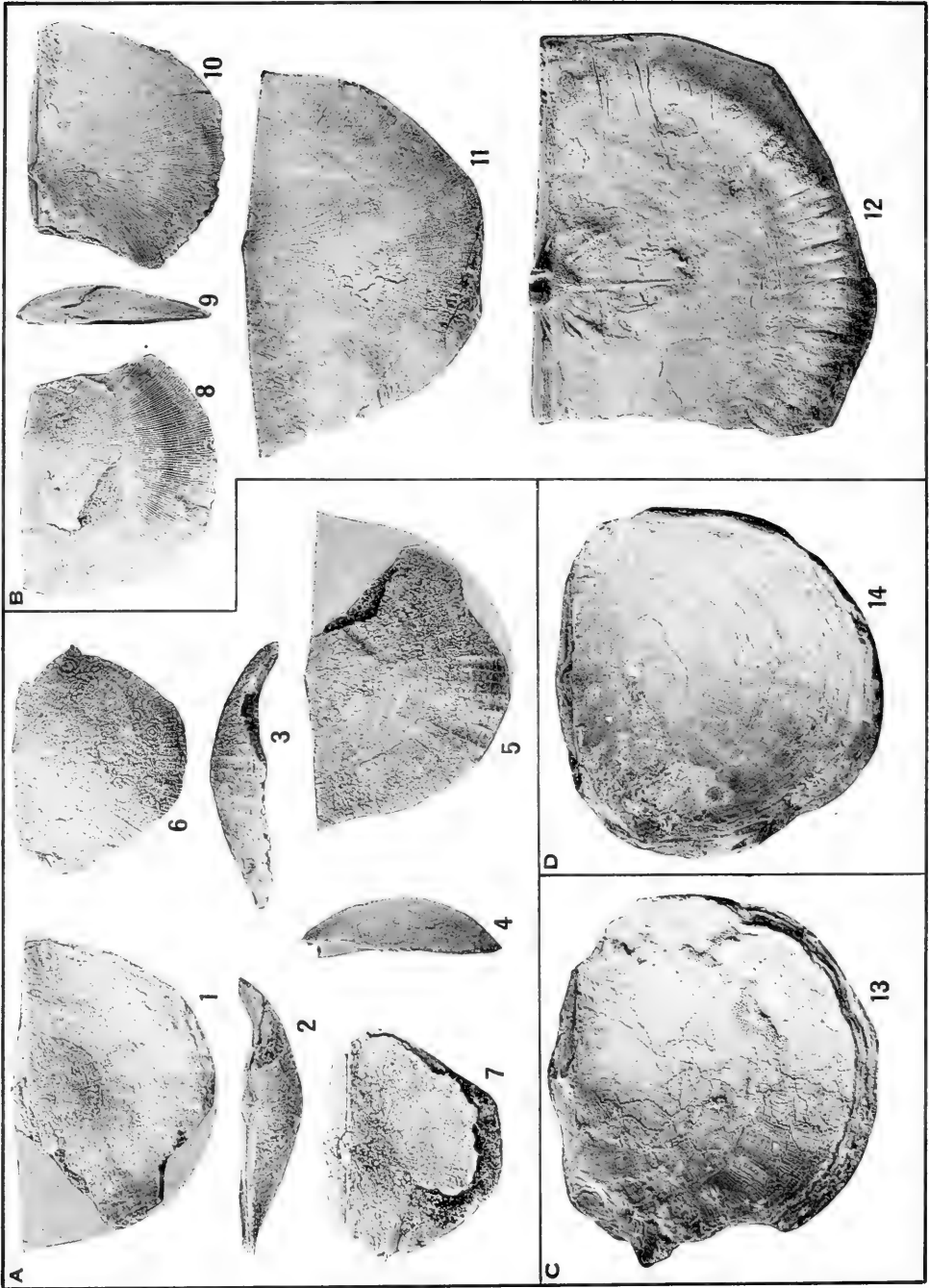
MACROCOELIA  
(SEE EXPLANATION OF PLATES.)



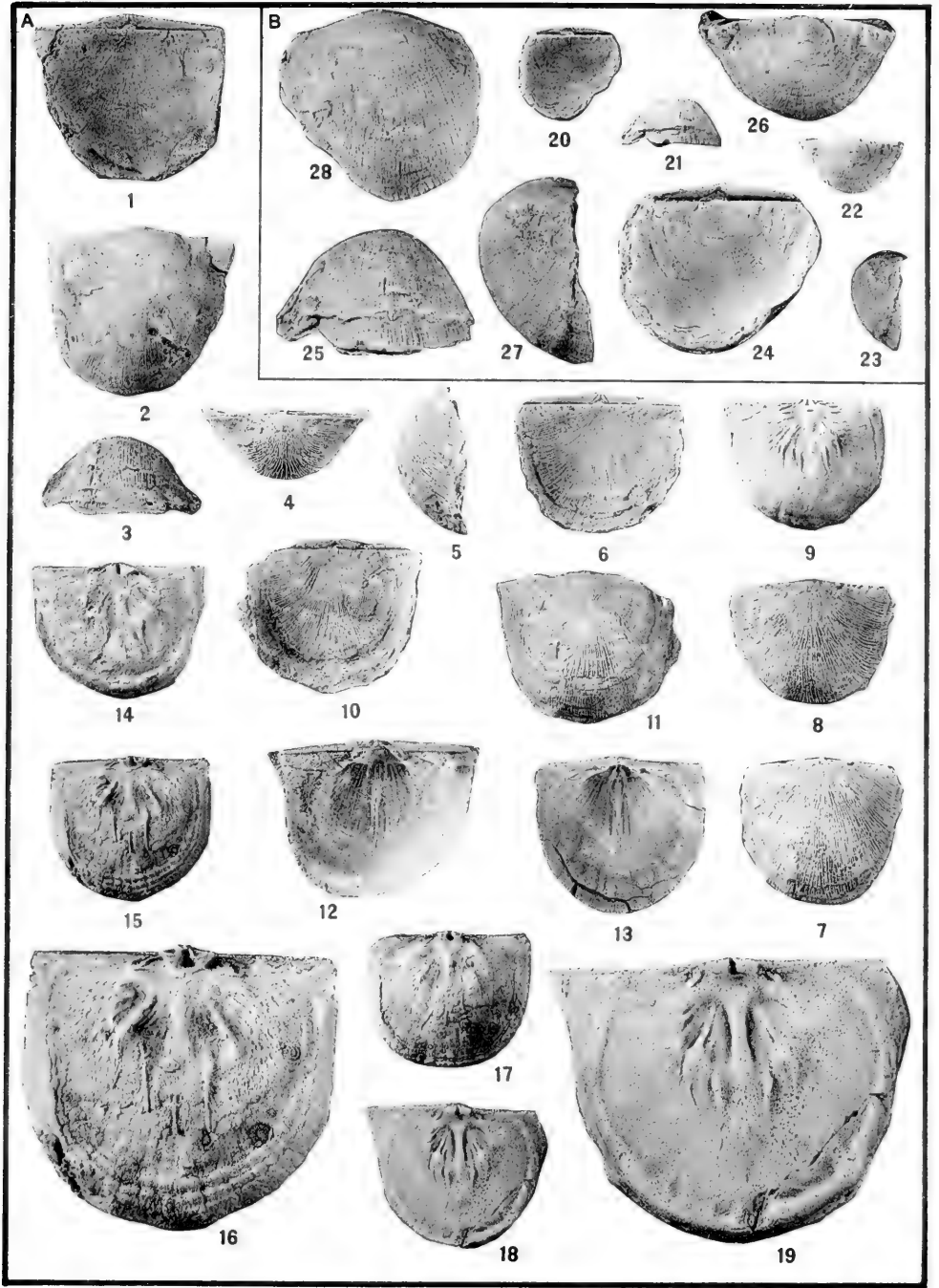
MISCELLANEOUS COLLECTIONS



GLYPTOMENA, MACROCOELIA  
(SEE EXPLANATION OF PLATES.)

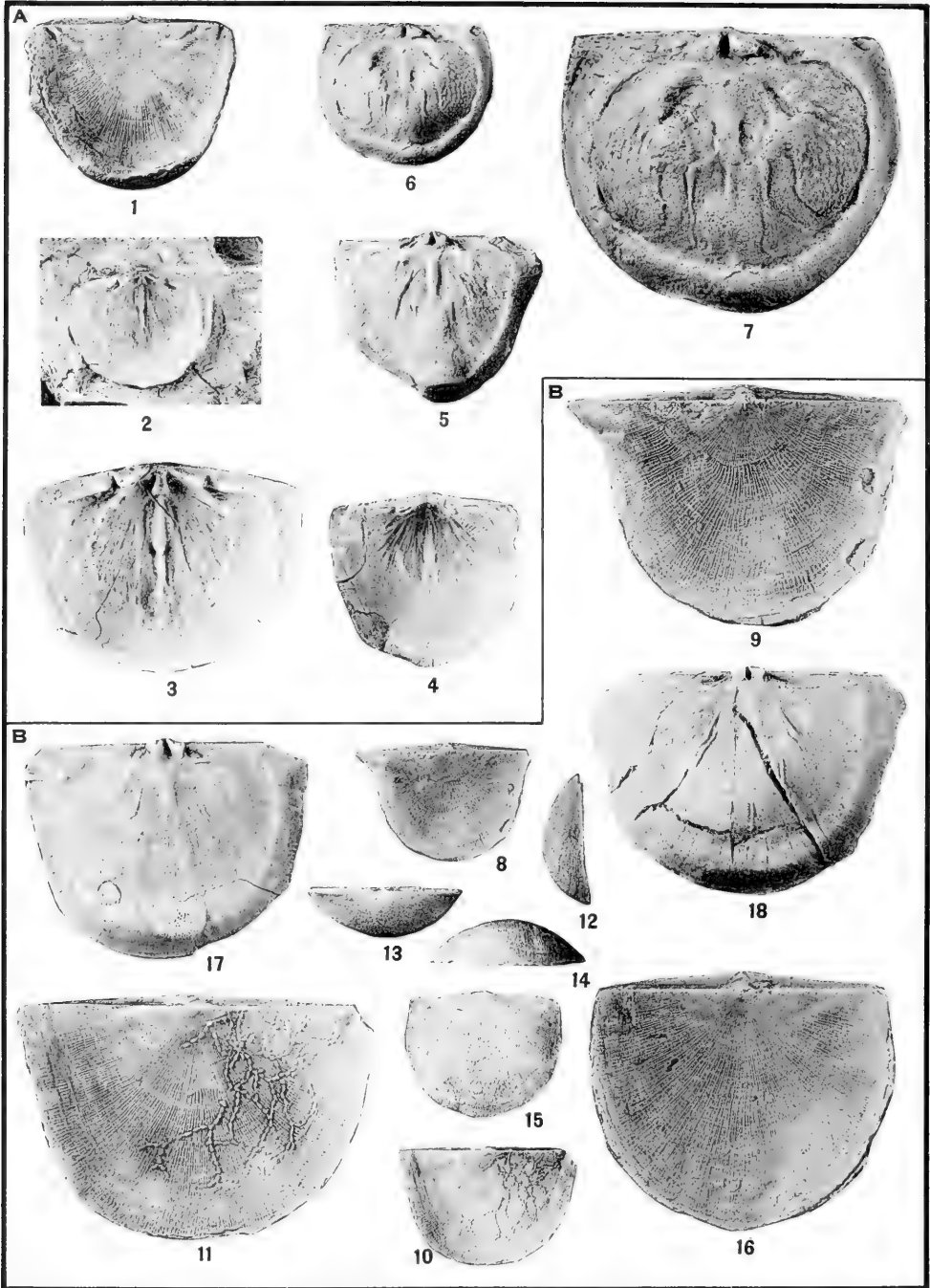






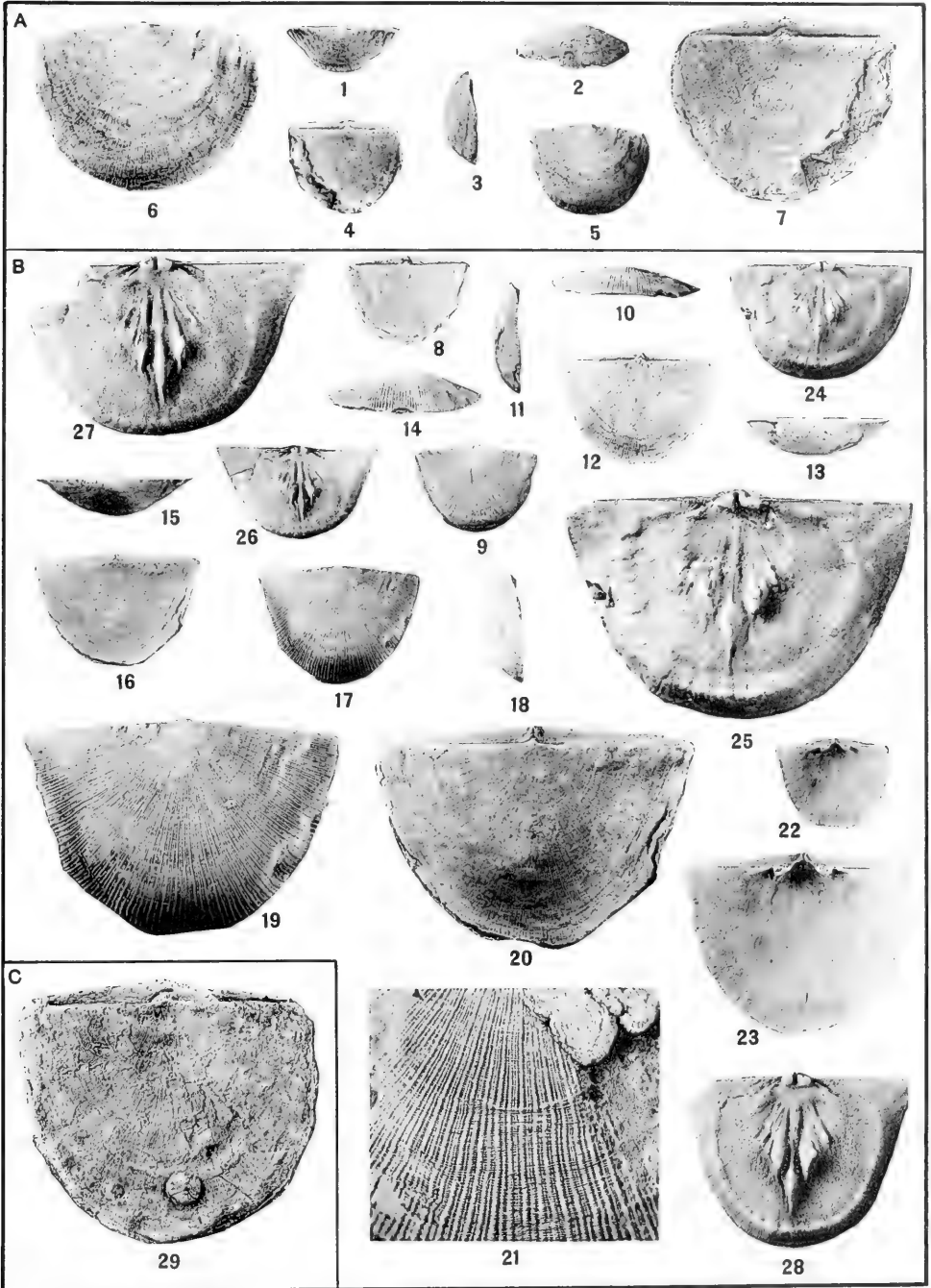
ÖPIKINA

(SEE EXPLANATION OF PLATES.)

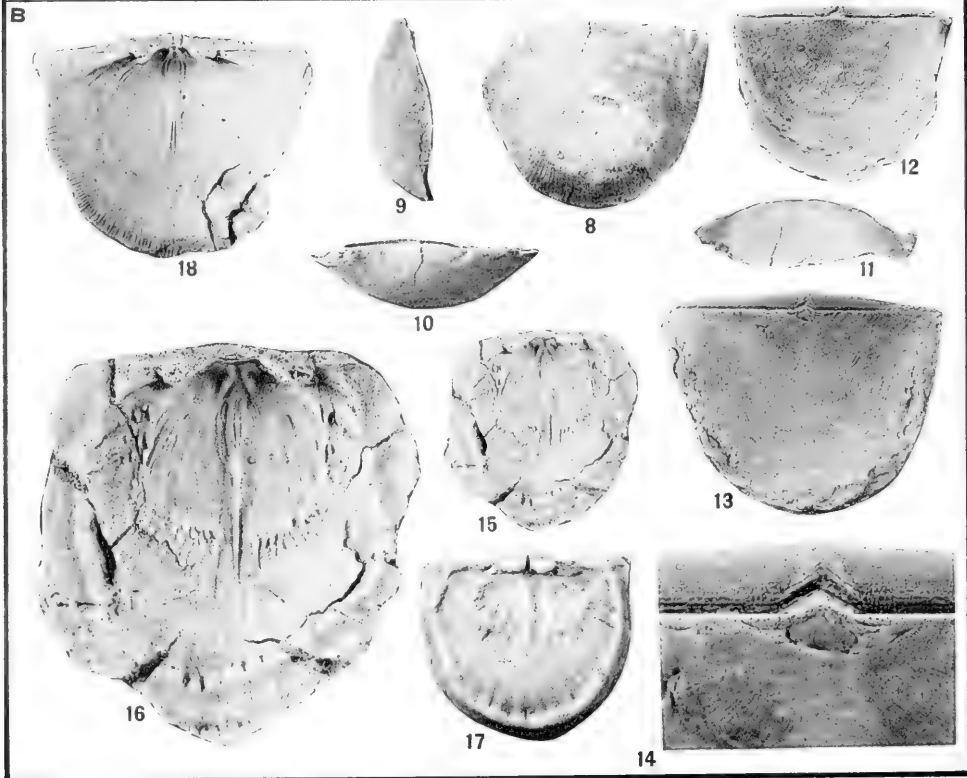
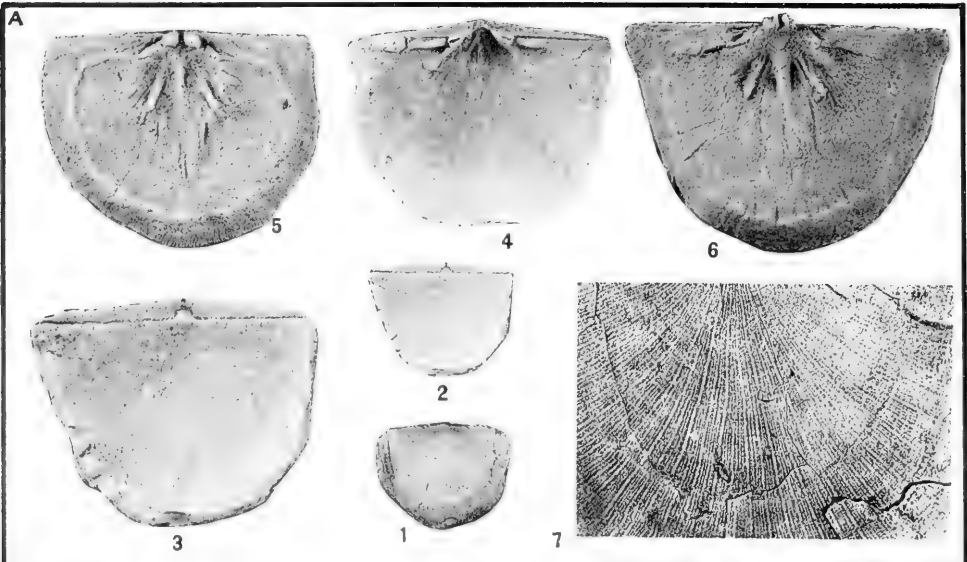


ÖPIKINA

(SEE EXPLANATION OF PLATES.)

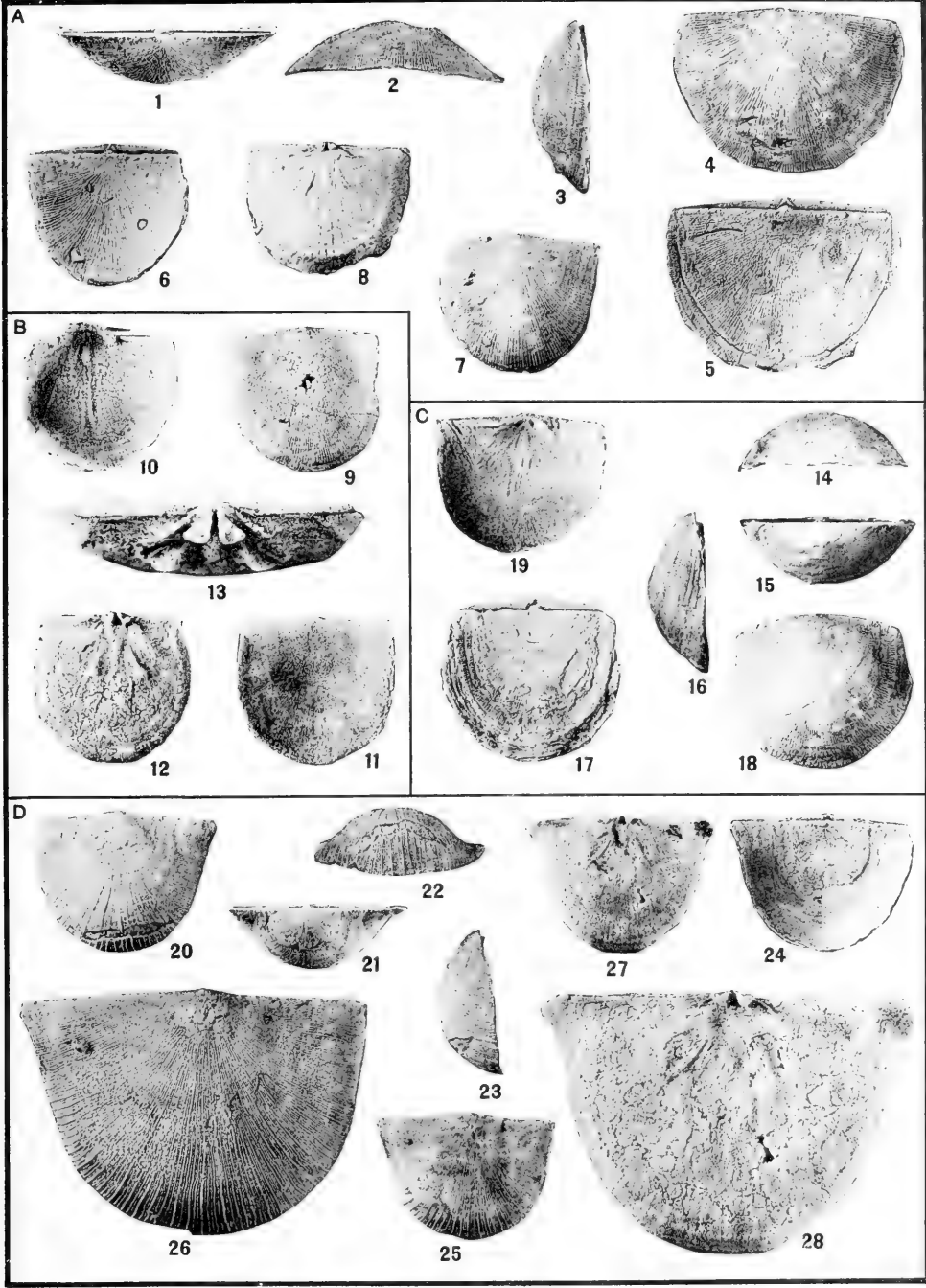


MACROCOELIA, ÖPIKINA  
(SEE EXPLANATION OF PLATES.)



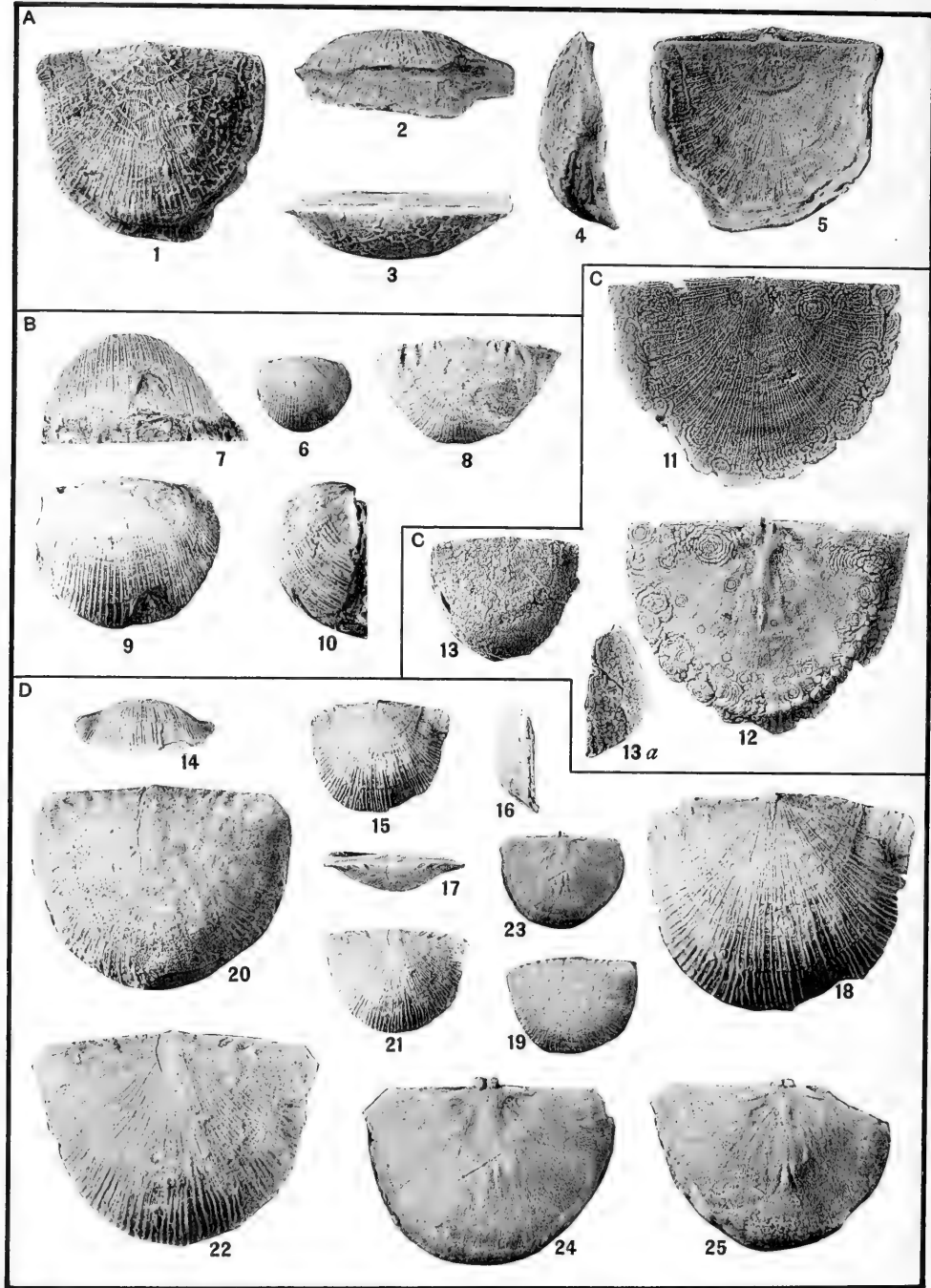
ÖPIKINA

(SEE EXPLANATION OF PLATES.)



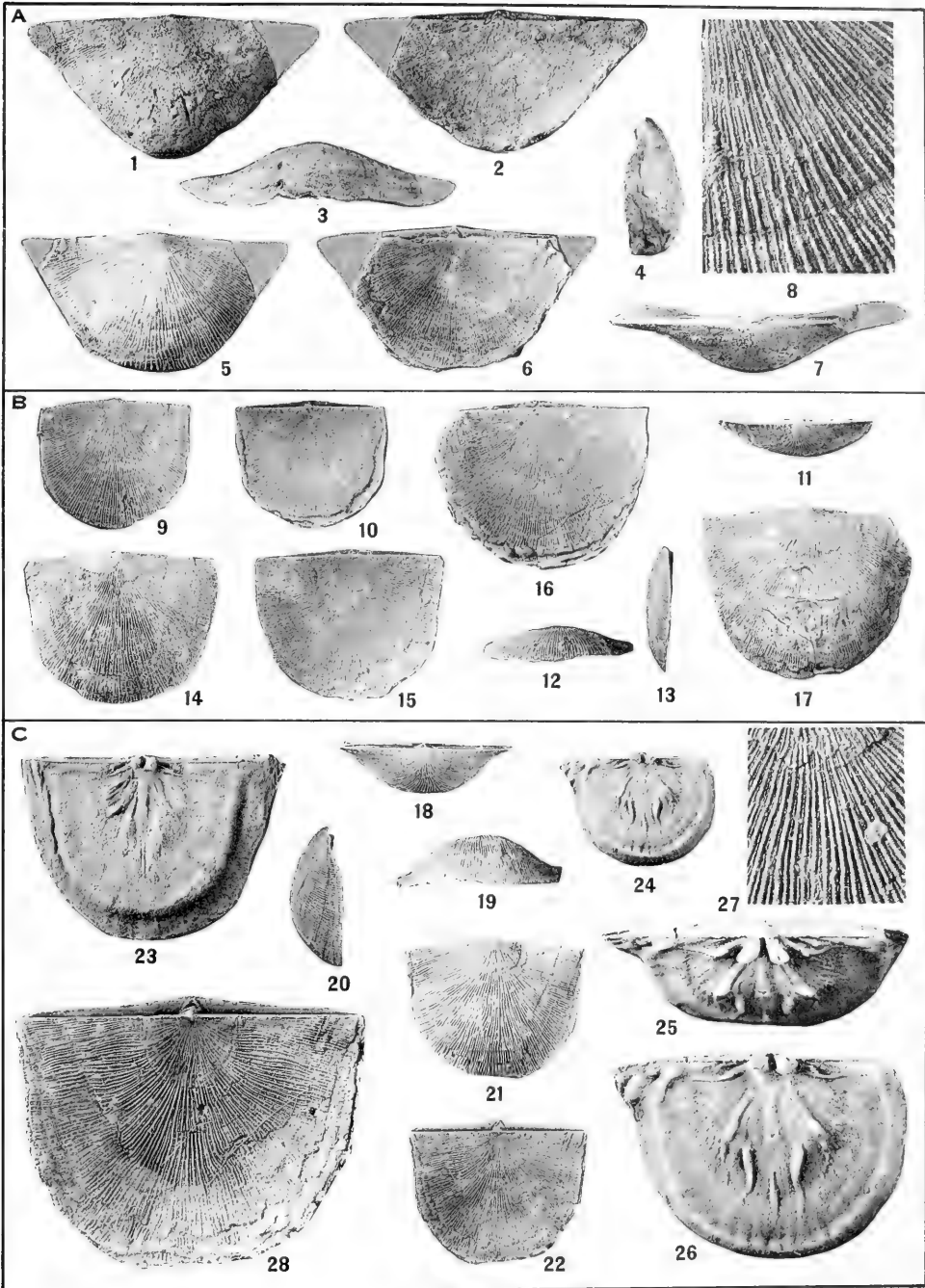
ÖPIKINA

(SEE EXPLANATION OF PLATES.)



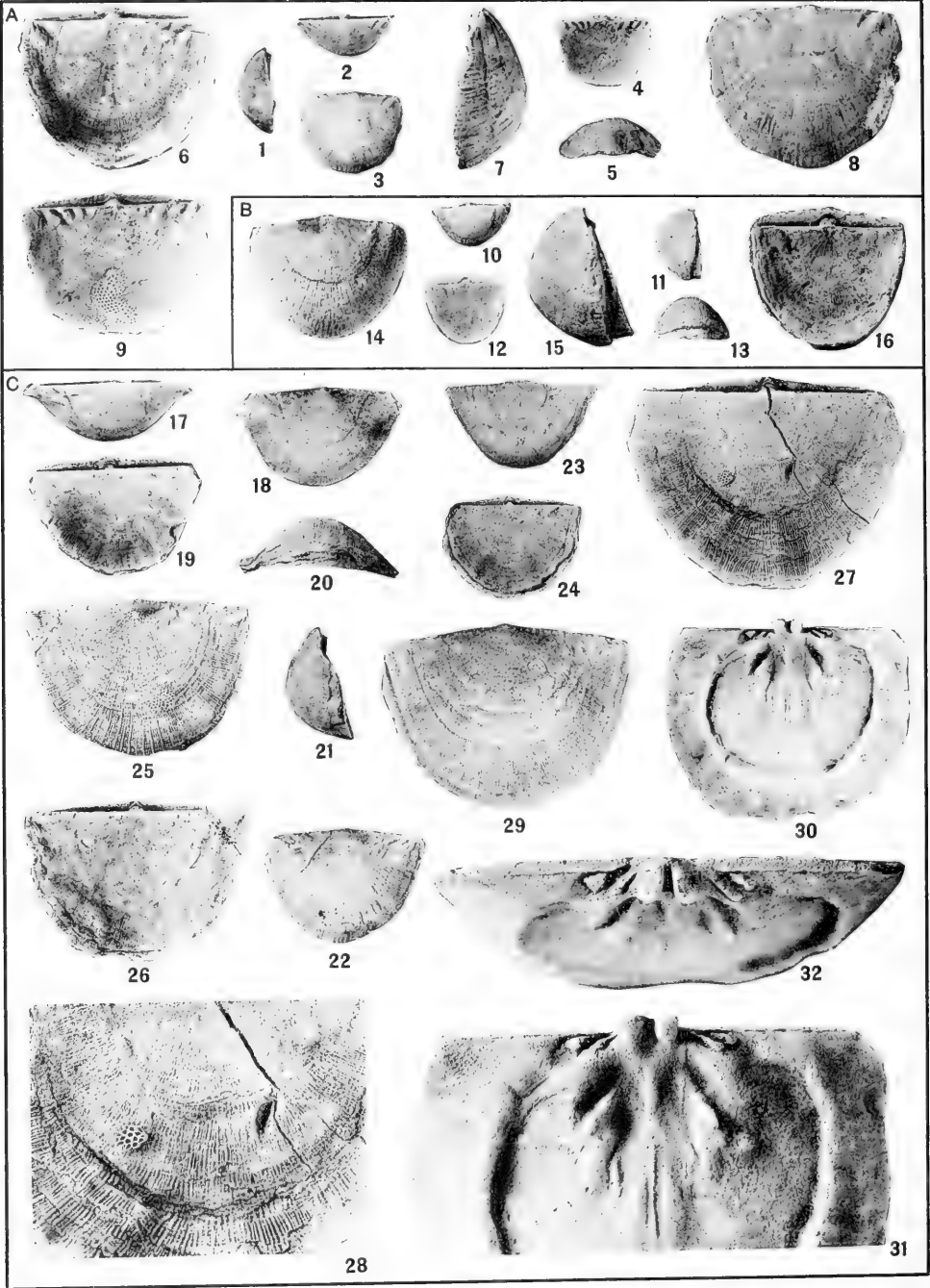
ÖPIKINA

(SEE EXPLANATION OF PLATES.)



ÖPIKINA

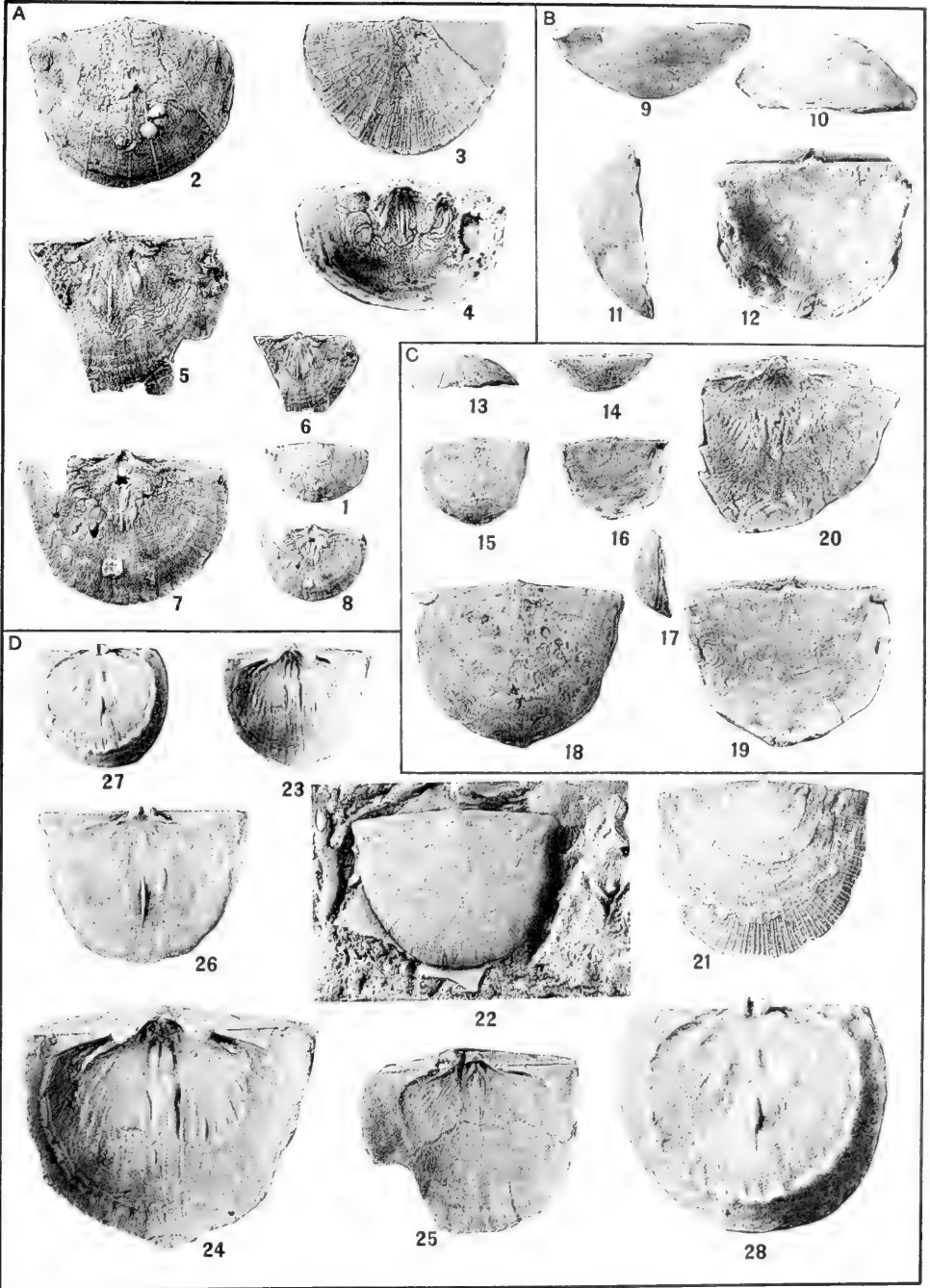
(SEE EXPLANATION OF PLATES.)



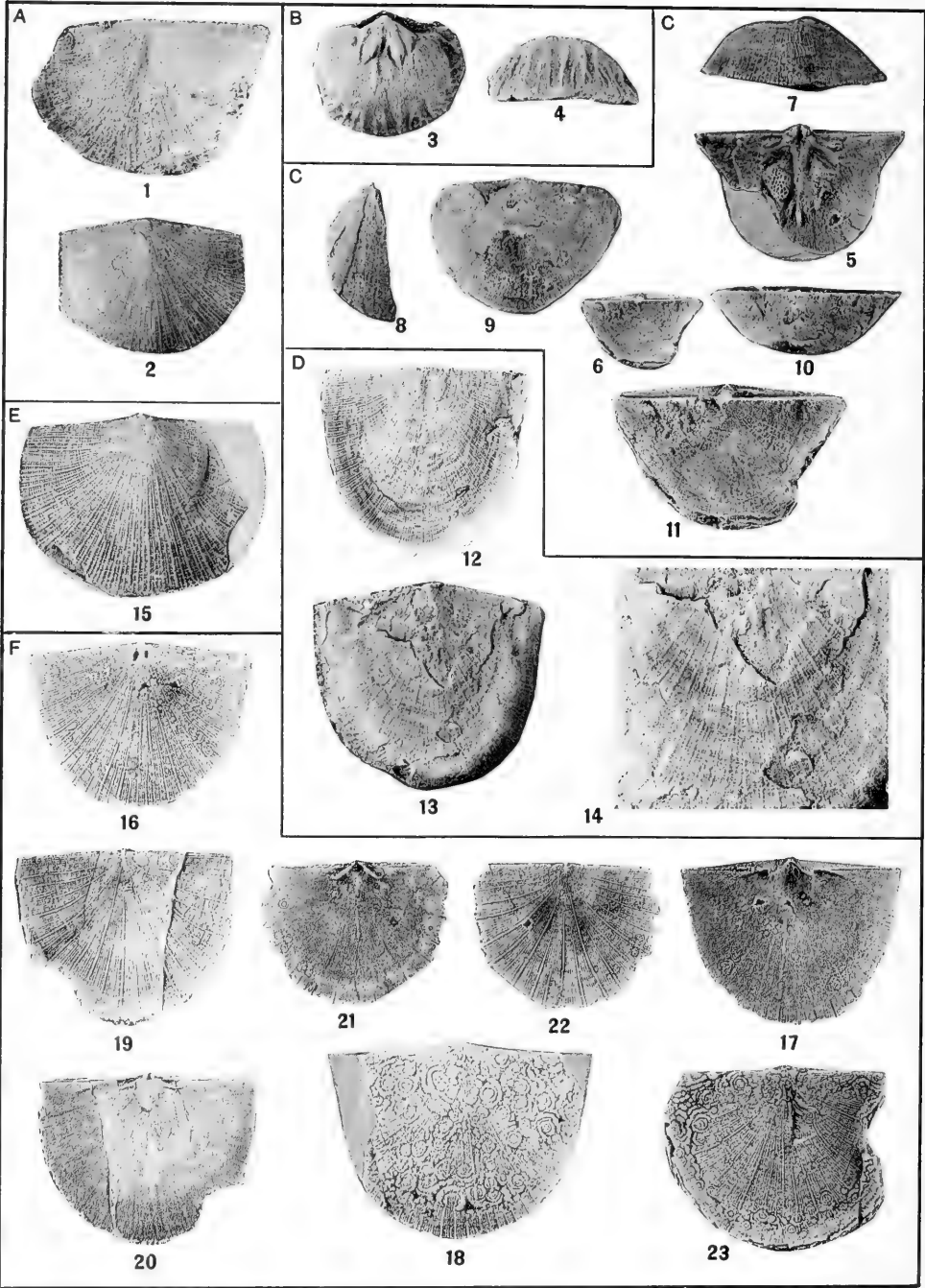
ÖPIKINA

(SEE EXPLANATION OF PLATES.)

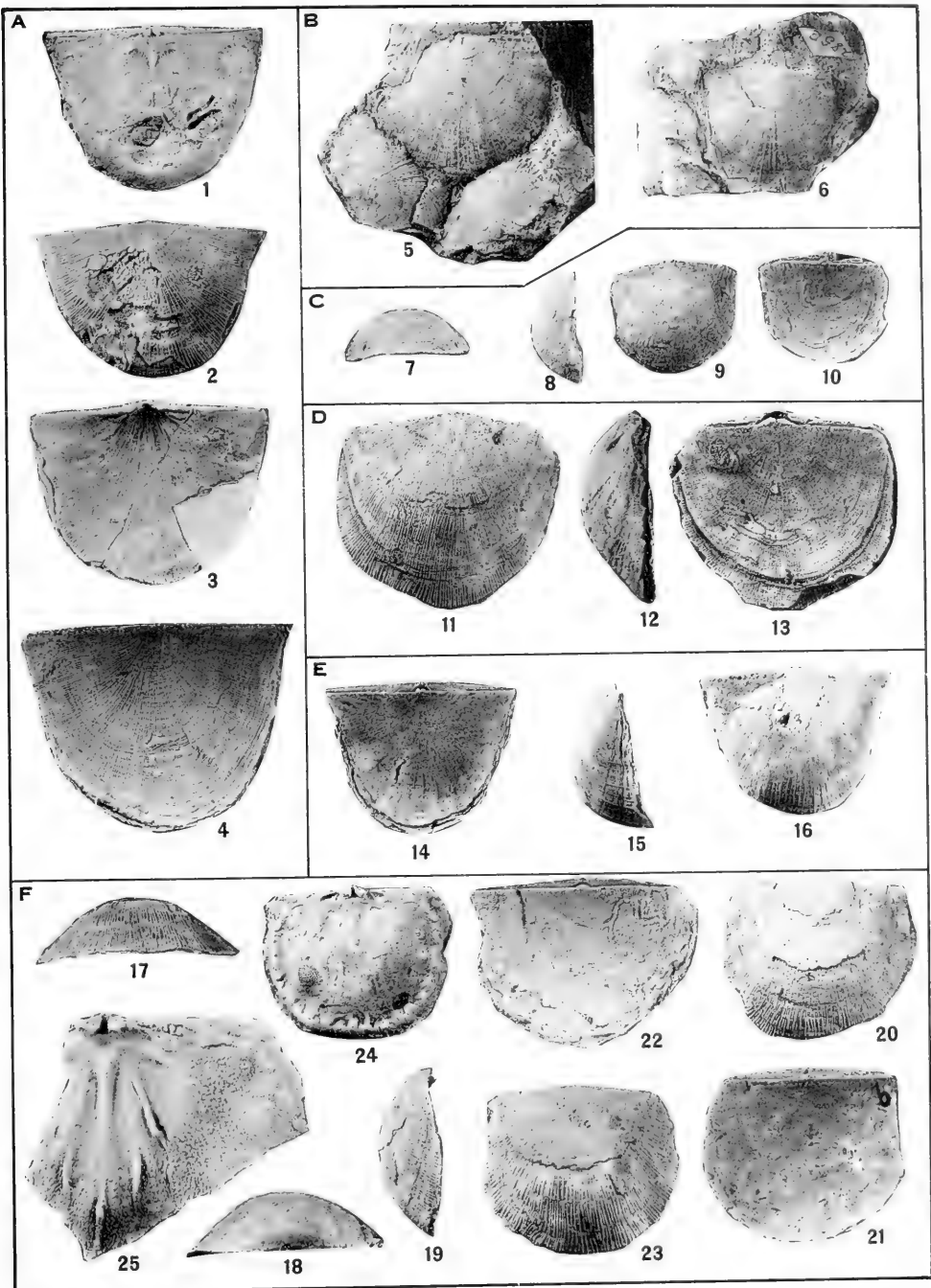




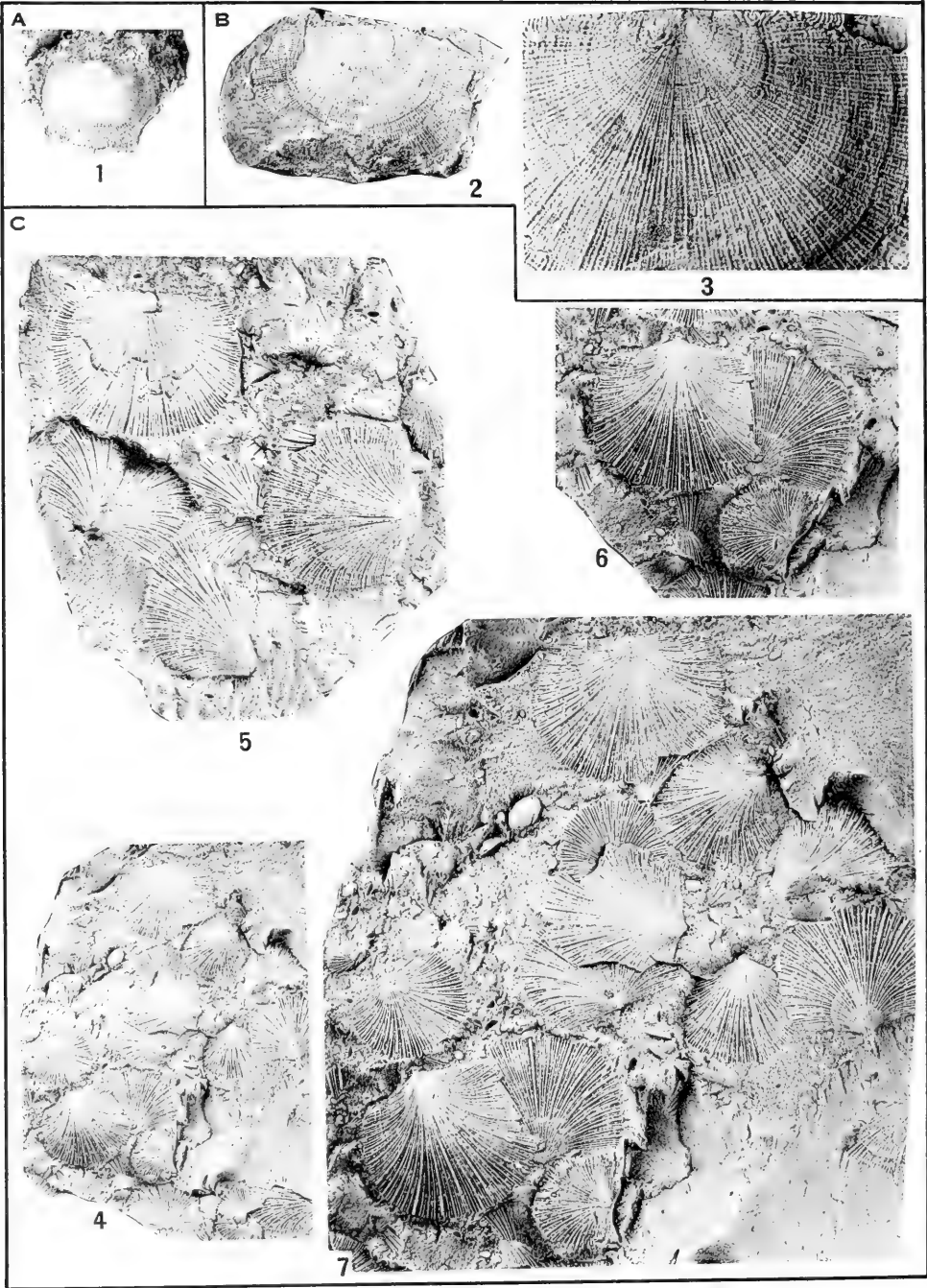
GLYPTOMENA, ÖPIKINA  
(SEE EXPLANATION OF PLATES.)



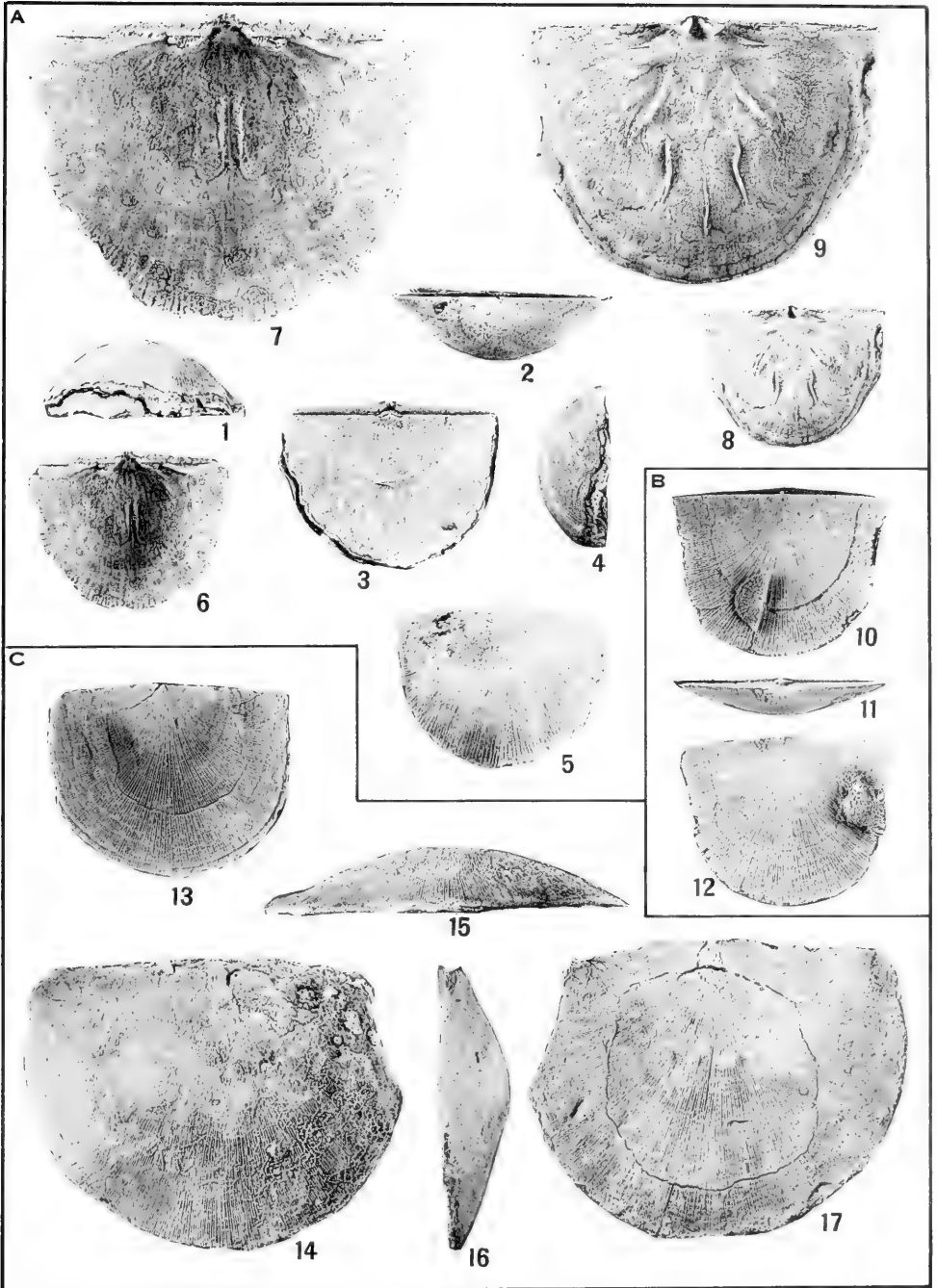
GLYPTOMENA, ÖPIKINA, PIONOMENA  
(SEE EXPLANATION OF PLATES.)



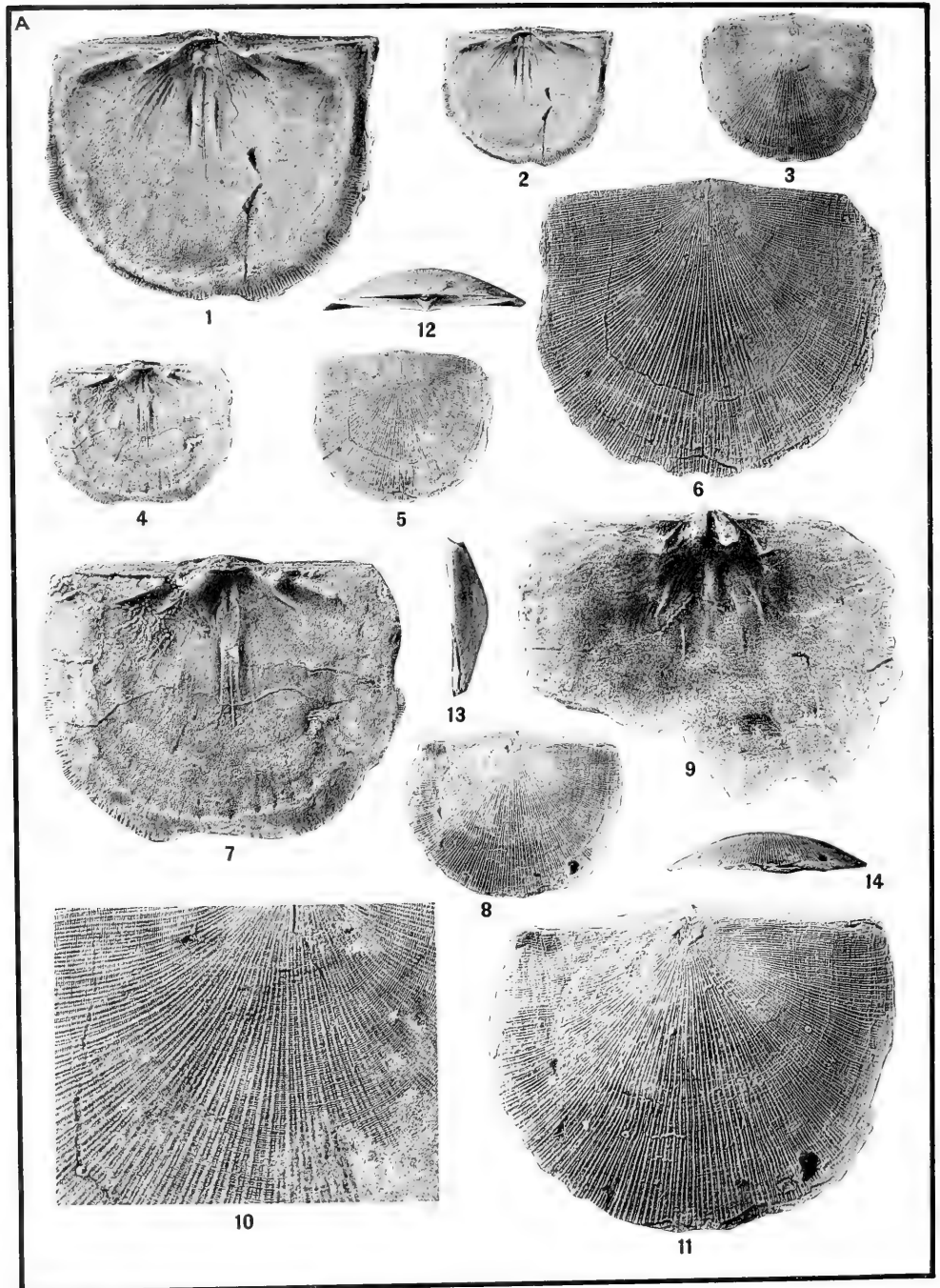
MACROCOELIA, ÖPIKINA, RAFINESQUINA  
 (SEE EXPLANATION OF PLATES.)



PIONOMENA, RHIPIDOMENA, STROPHOMENA  
(SEE EXPLANATION OF PLATES.)

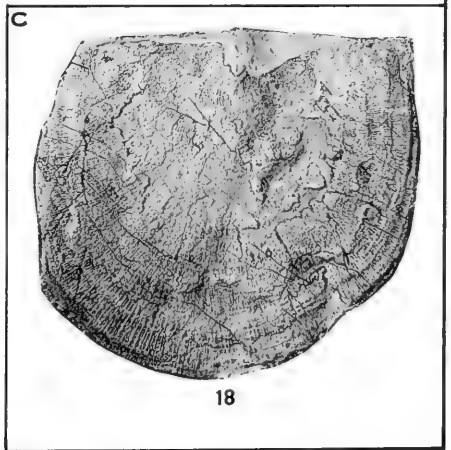
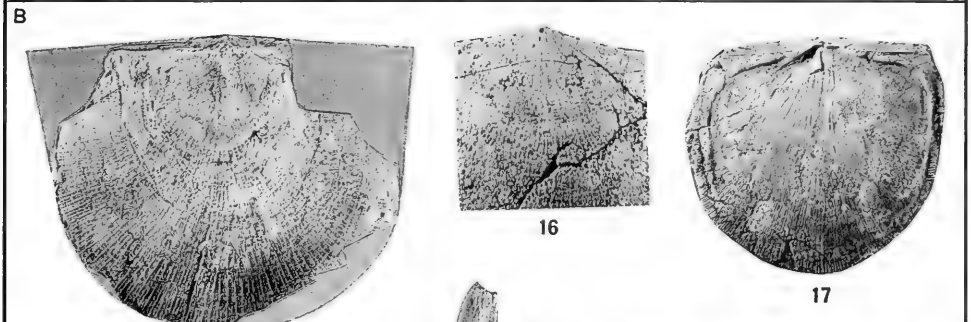
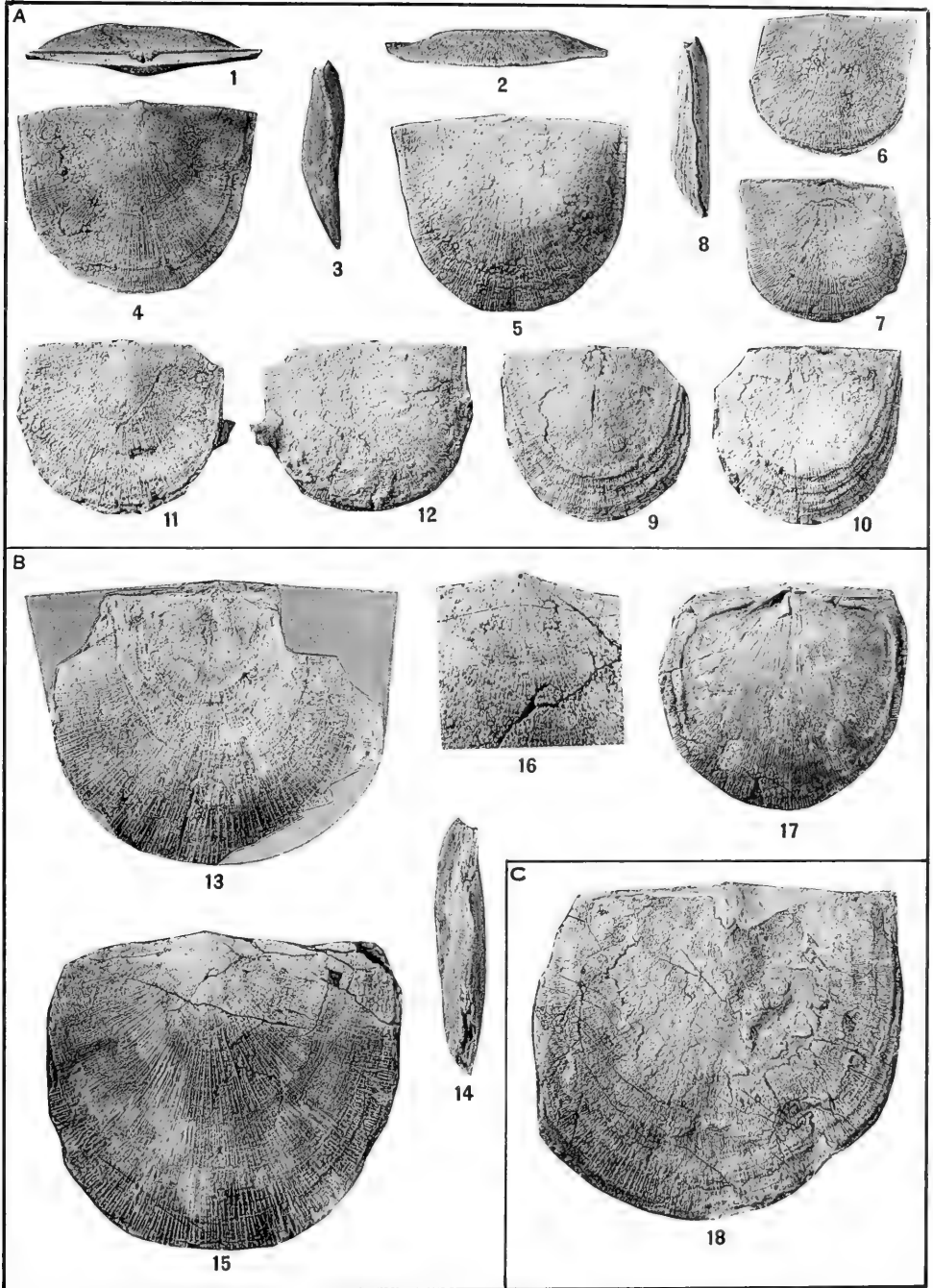


MACROCOELIA, ÖPIKINA, RHIPIDOMENA  
(SEE EXPLANATION OF PLATES.)

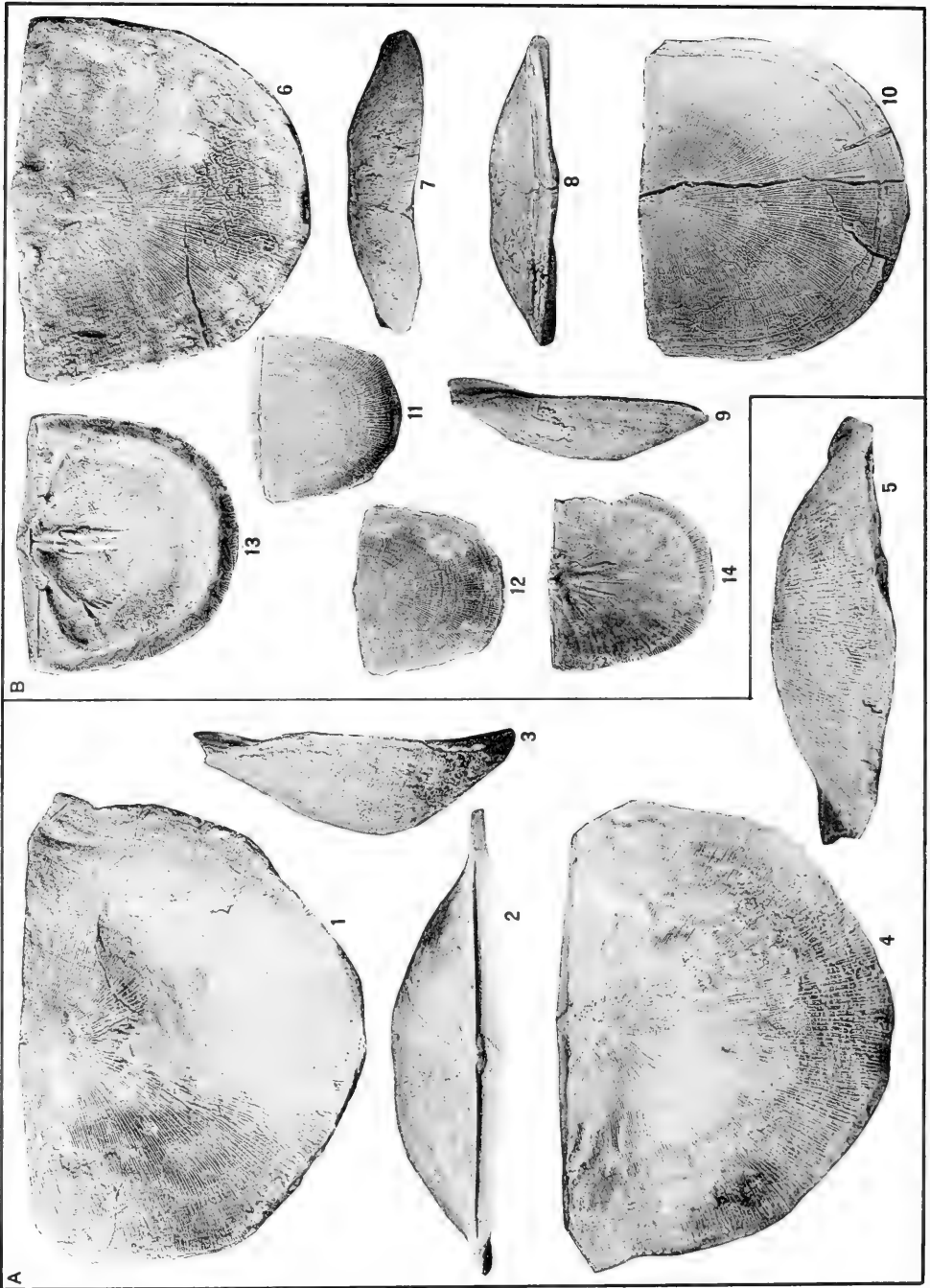


RHIPIDOMENA

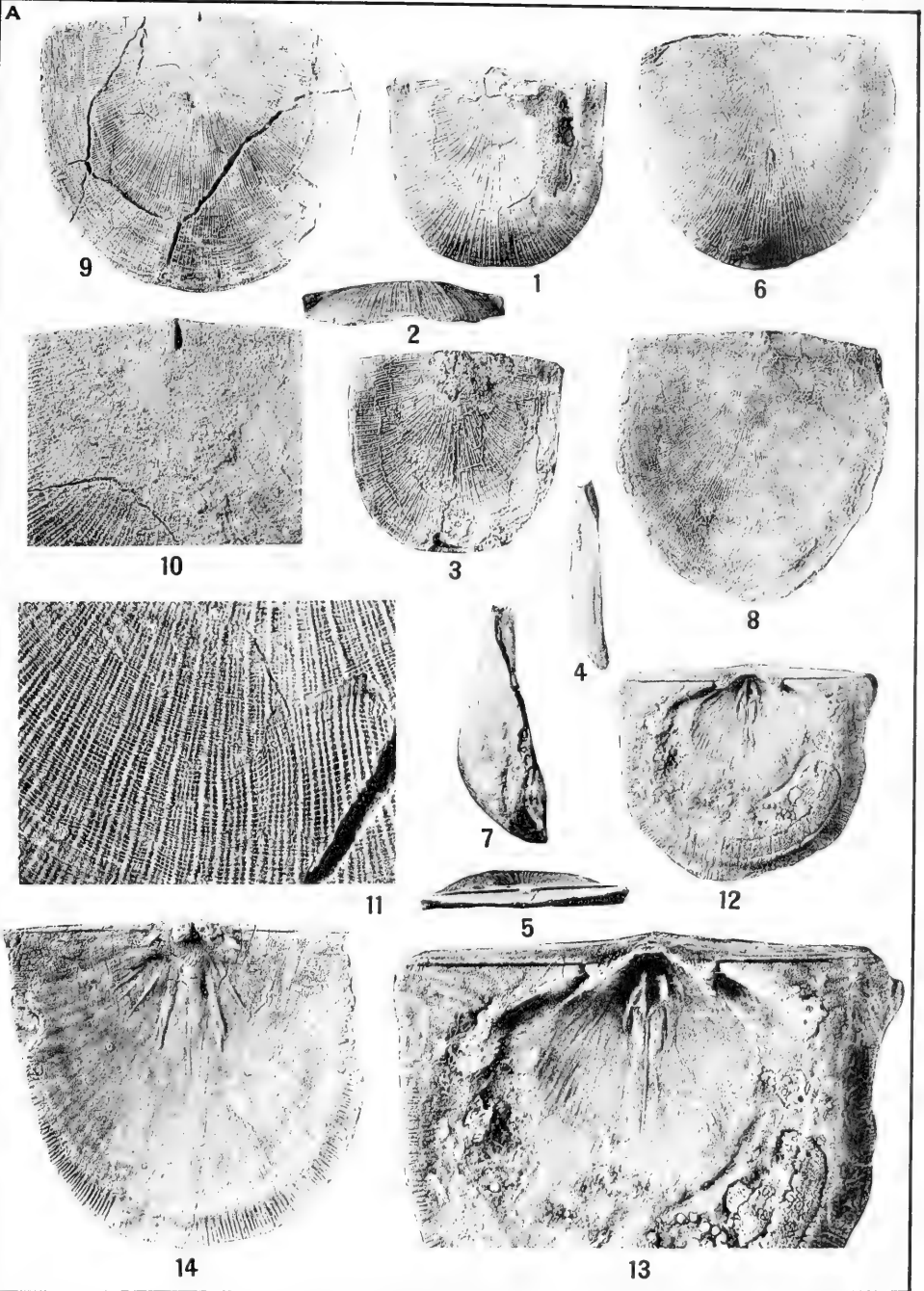
(SEE EXPLANATION OF PLATES.)



RHIPIDOMENA  
(SEE EXPLANATION OF PLATES.)

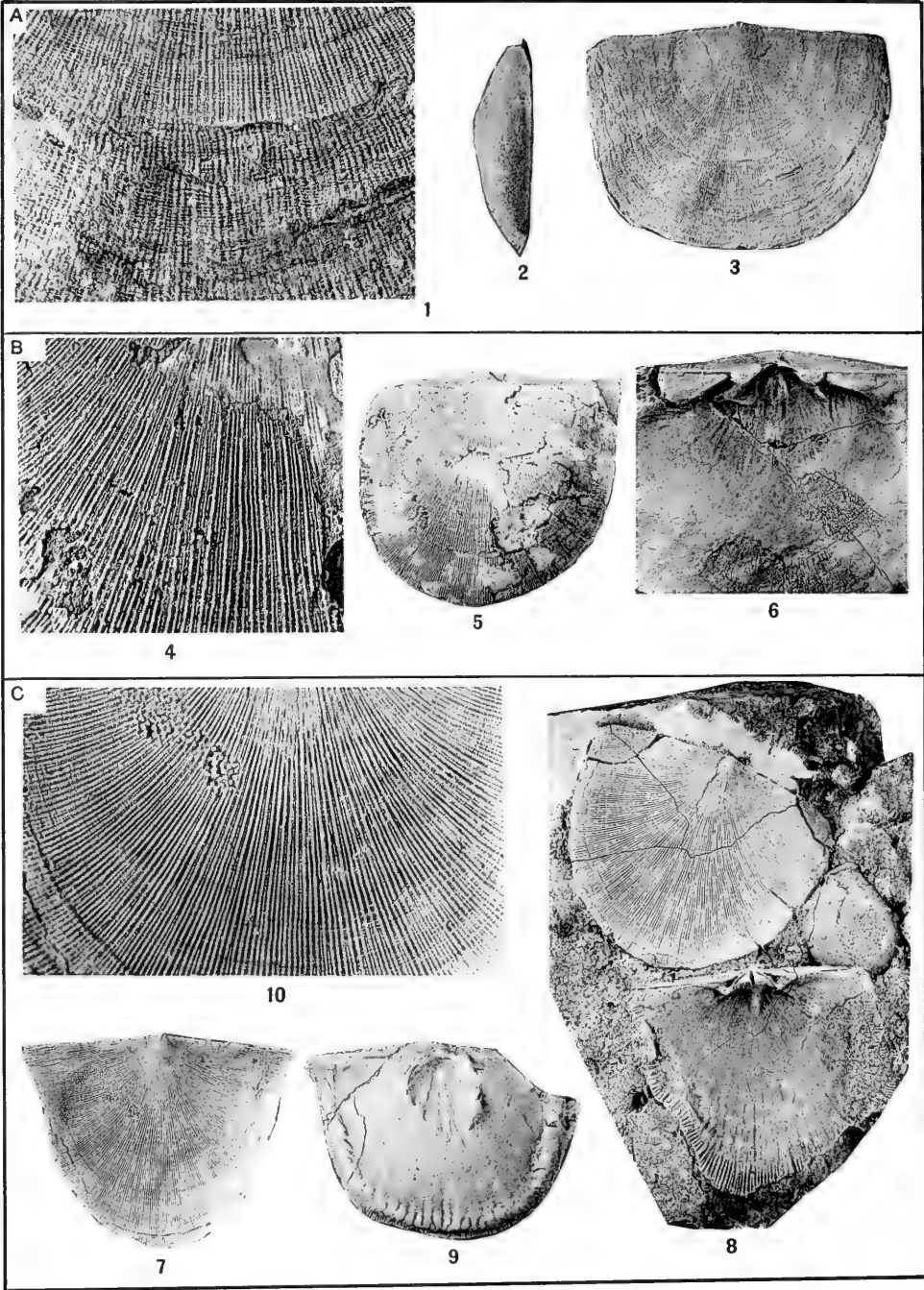






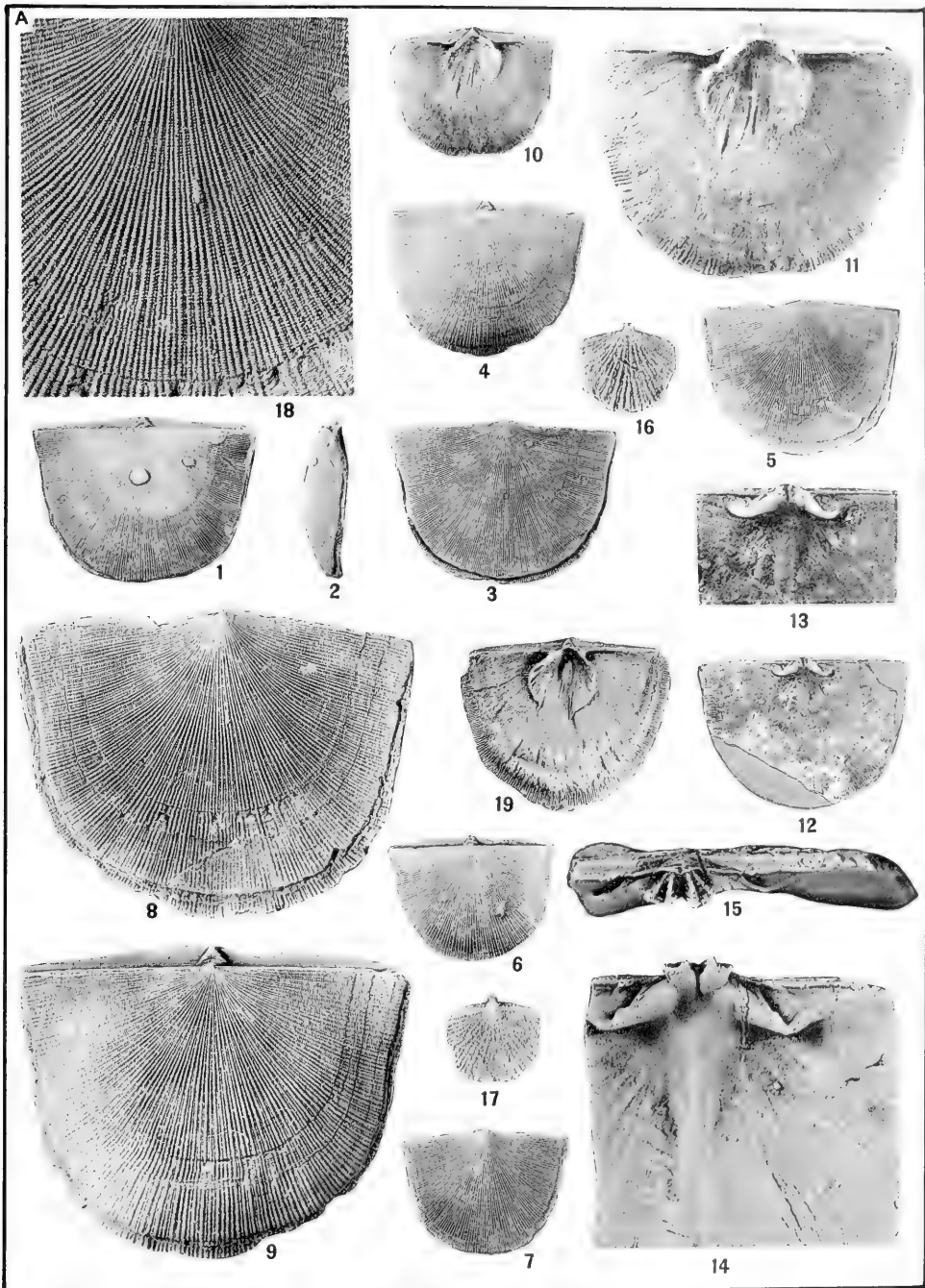
**RHIPIDOMENA**

(SEE EXPLANATION OF PLATES.)



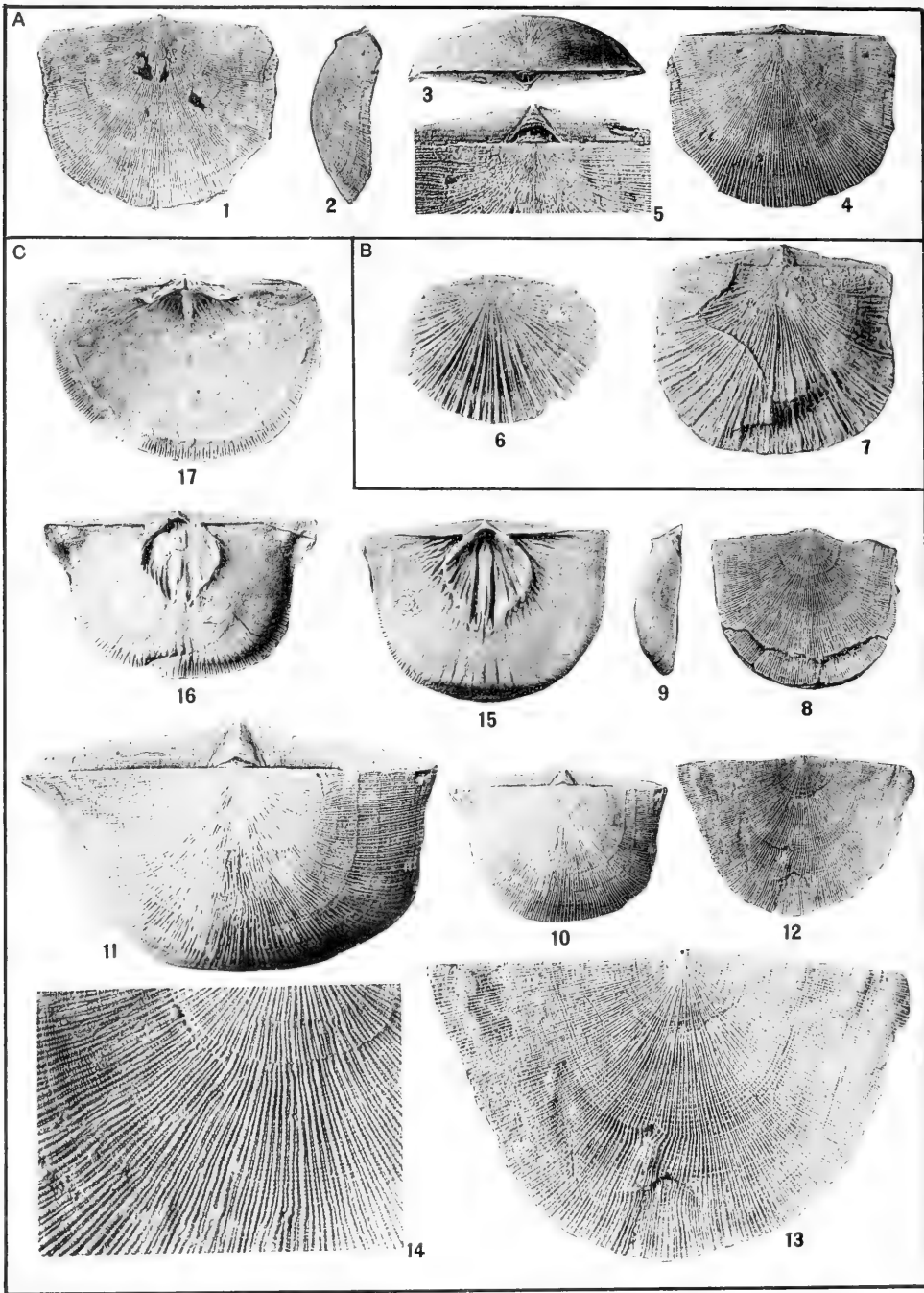
RHIPIDOMENA, STROPHOMENA

(SEE EXPLANATION OF PLATES.)



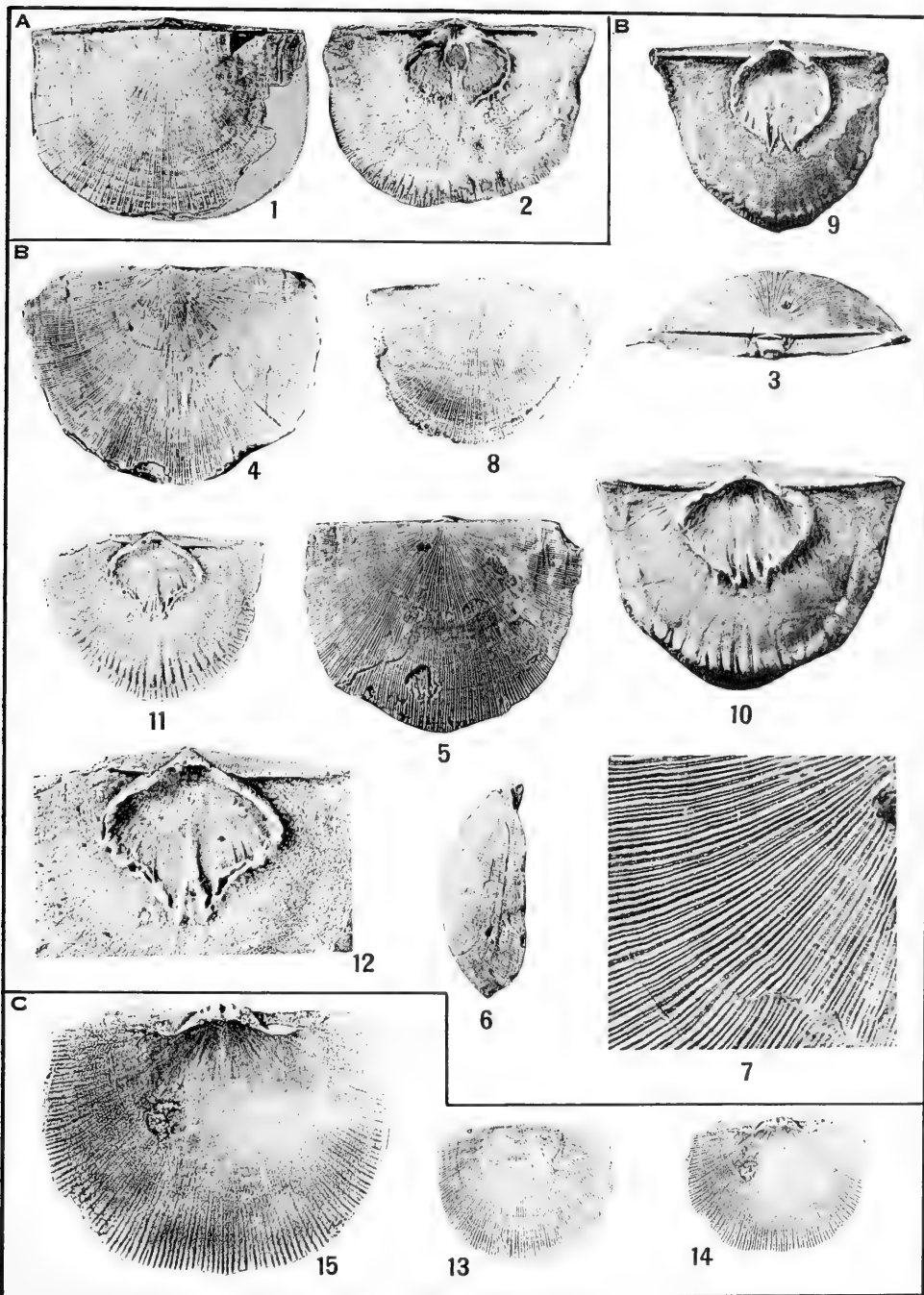
STROPHOMENA

(SEE EXPLANATION OF PLATES.)



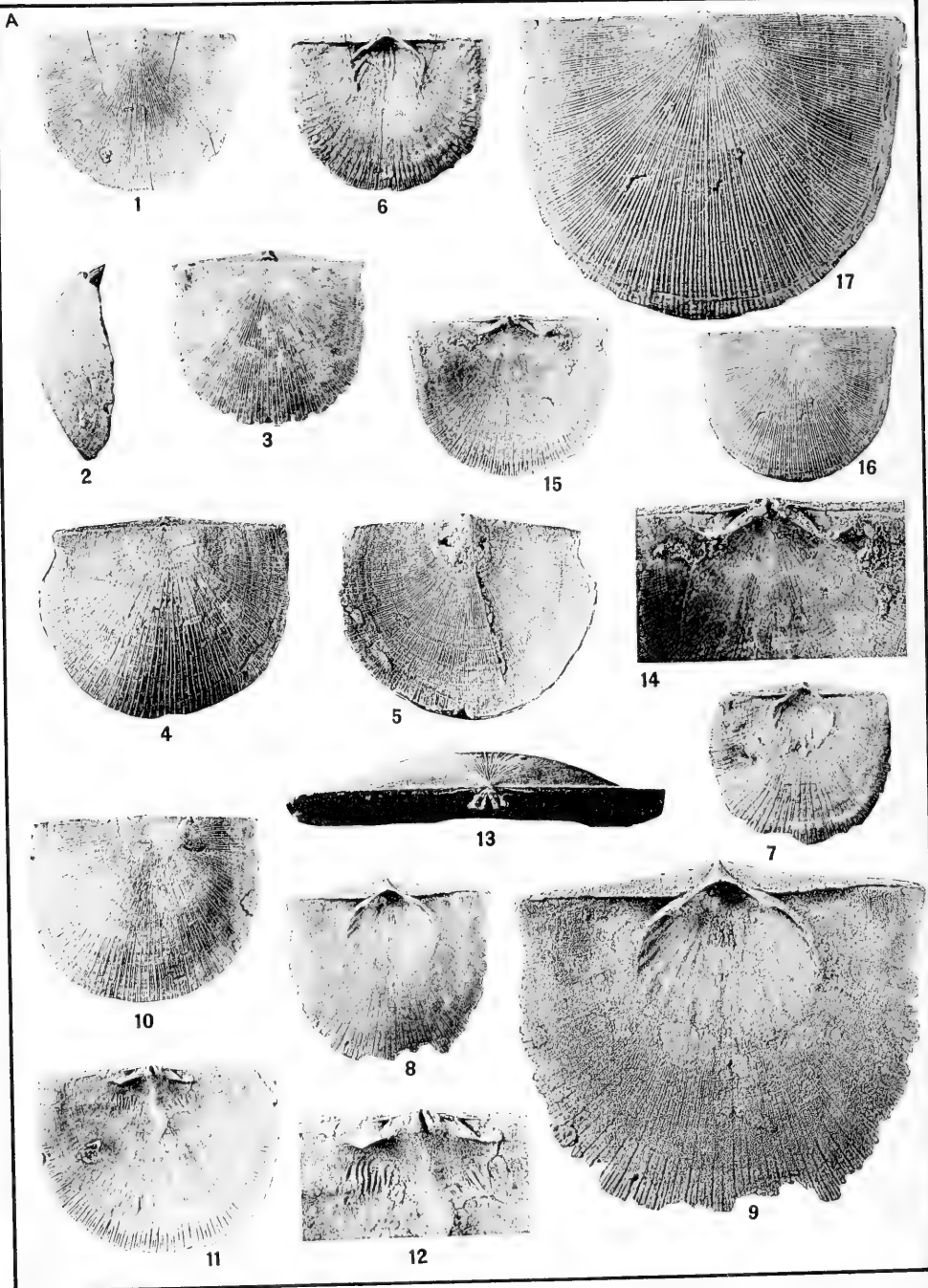
STROPHOMENA

(SEE EXPLANATION OF PLATES.)



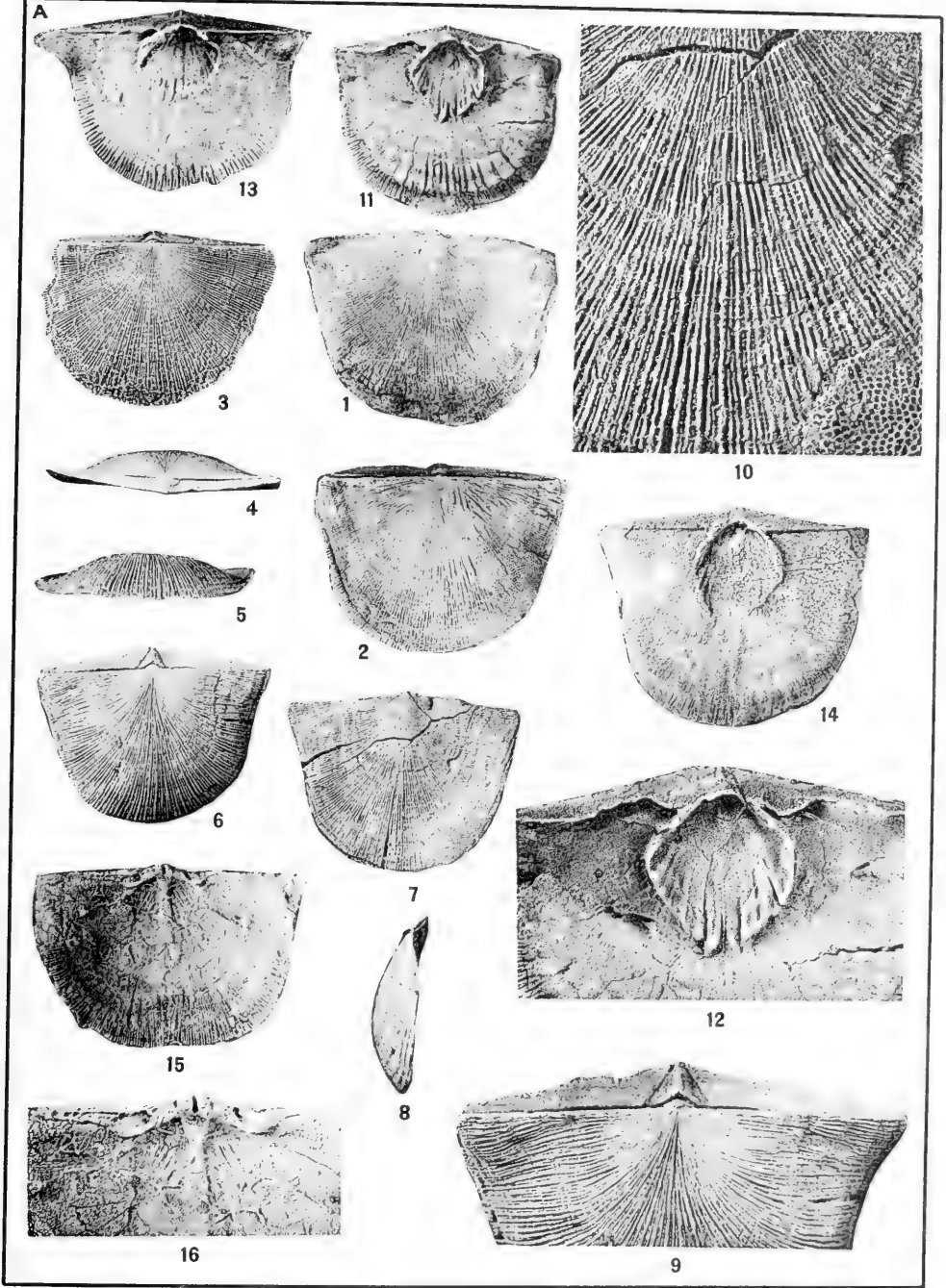
STROPHOMENA

(SEE EXPLANATION OF PLATES.)



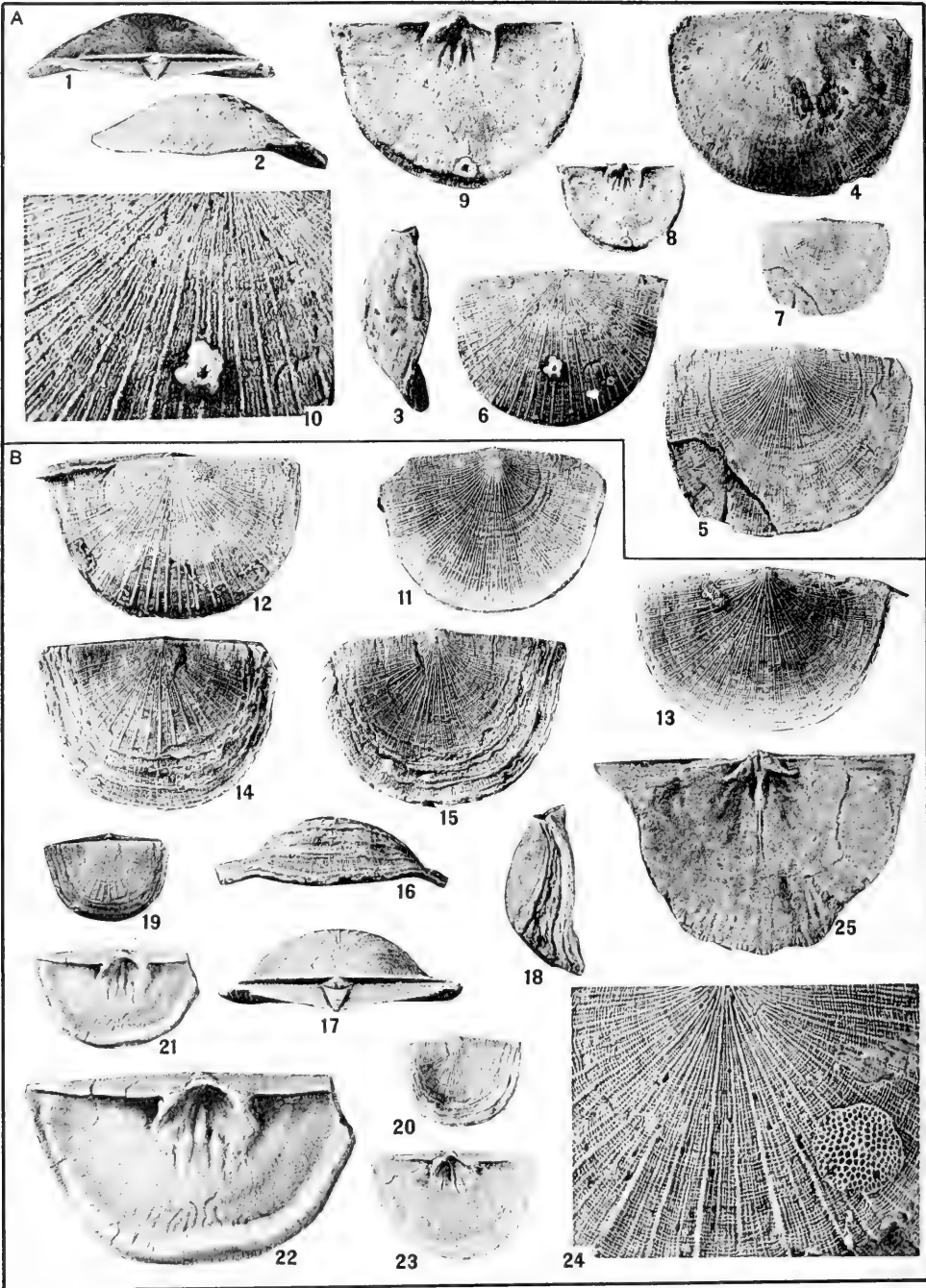
STROPHOMENA

(SEE EXPLANATION OF PLATES.)



STROPHOMENA

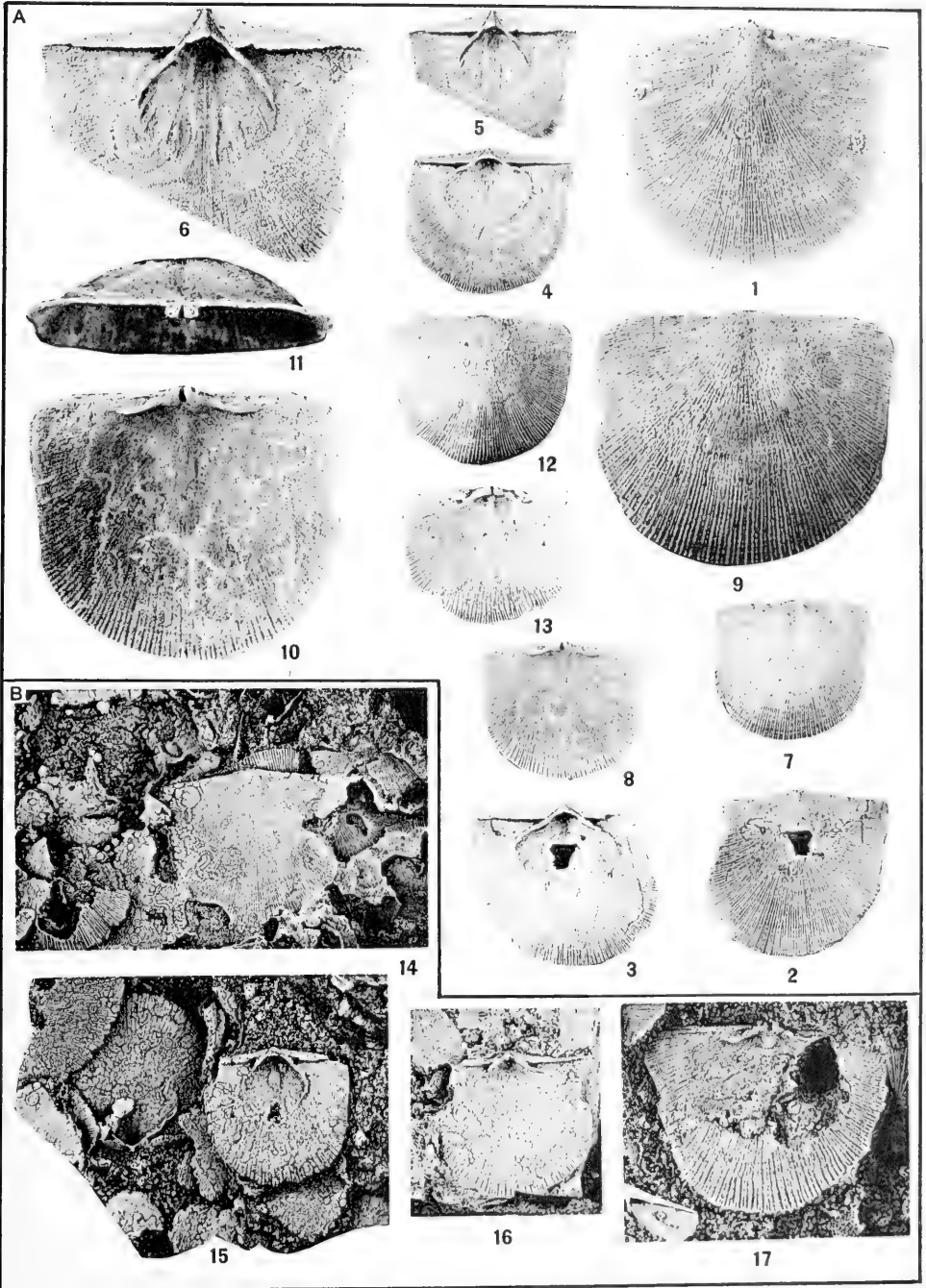
(SEE EXPLANATION OF PLATES.)



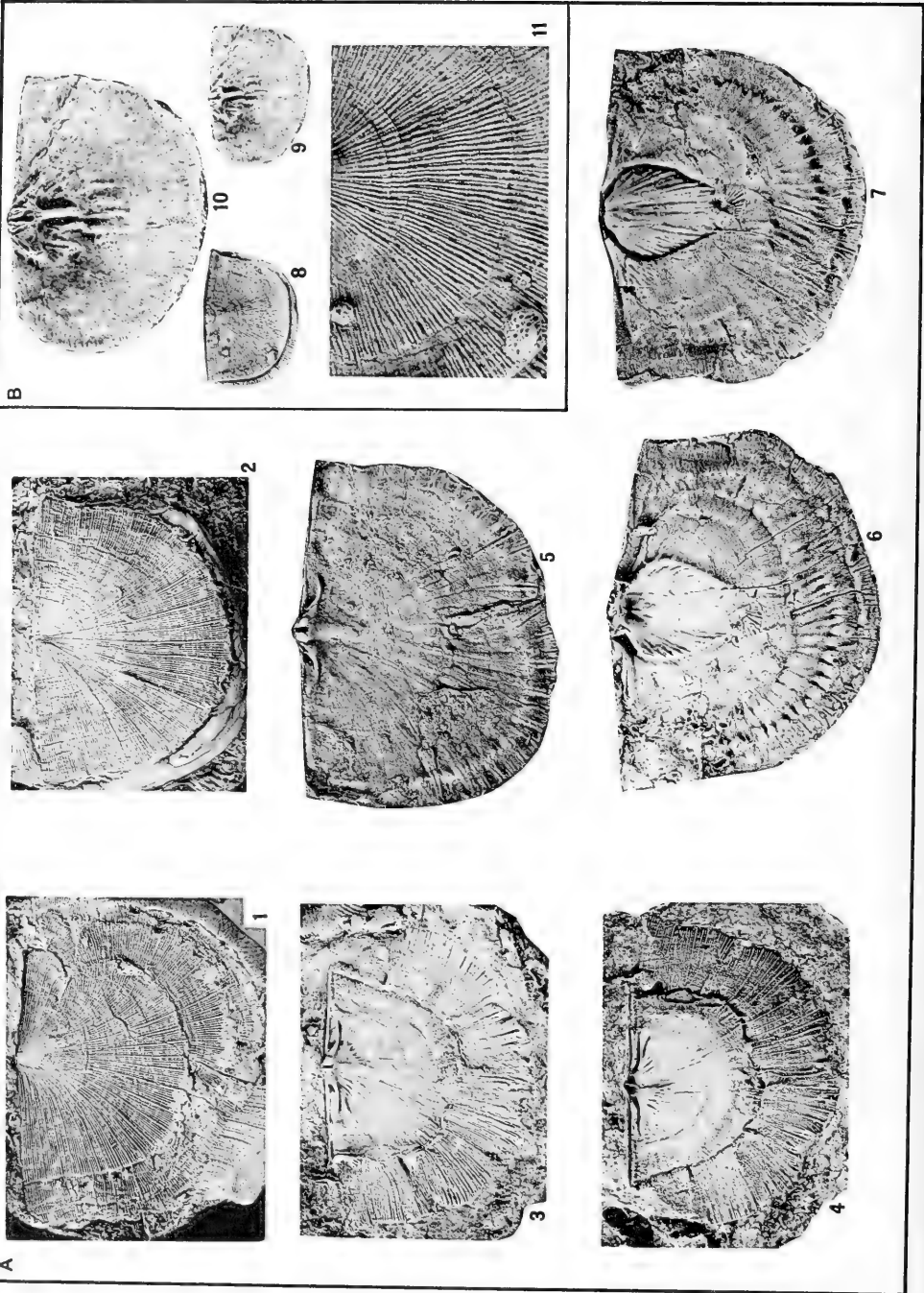
STROPHOMENA

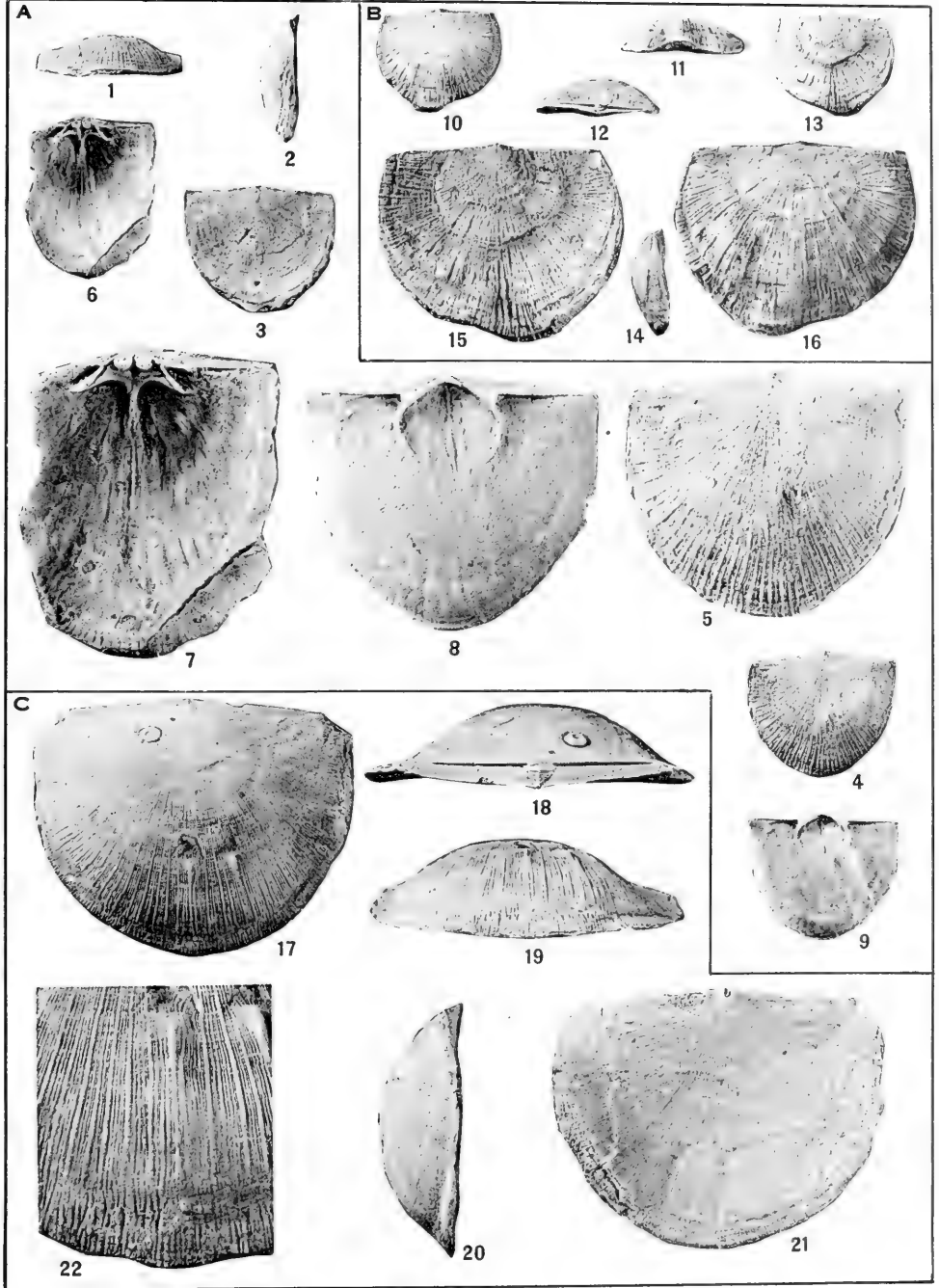
(SEE EXPLANATION OF PLATES.)





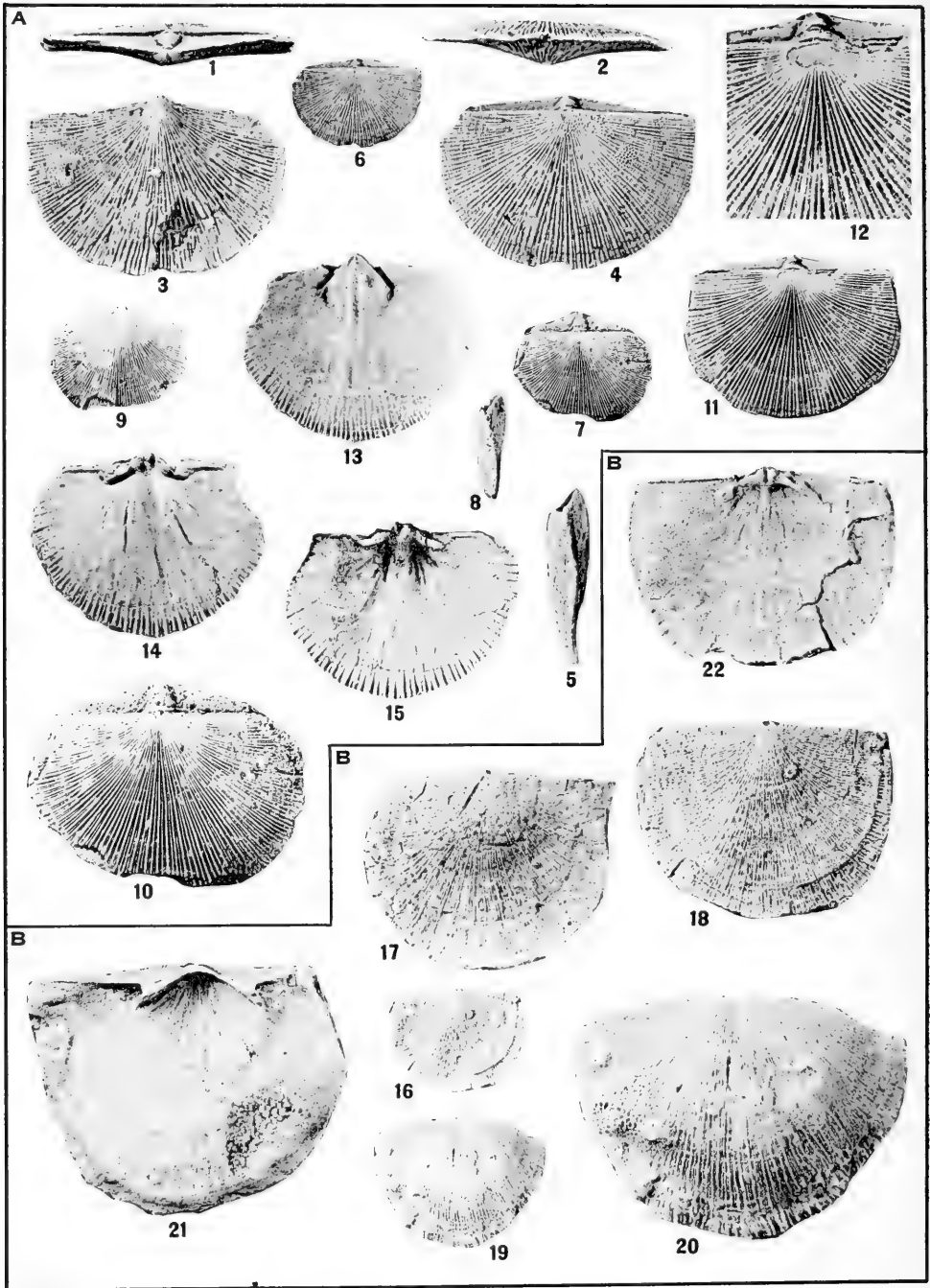
STROPHOMENA  
(SEE EXPLANATION OF PLATES.)





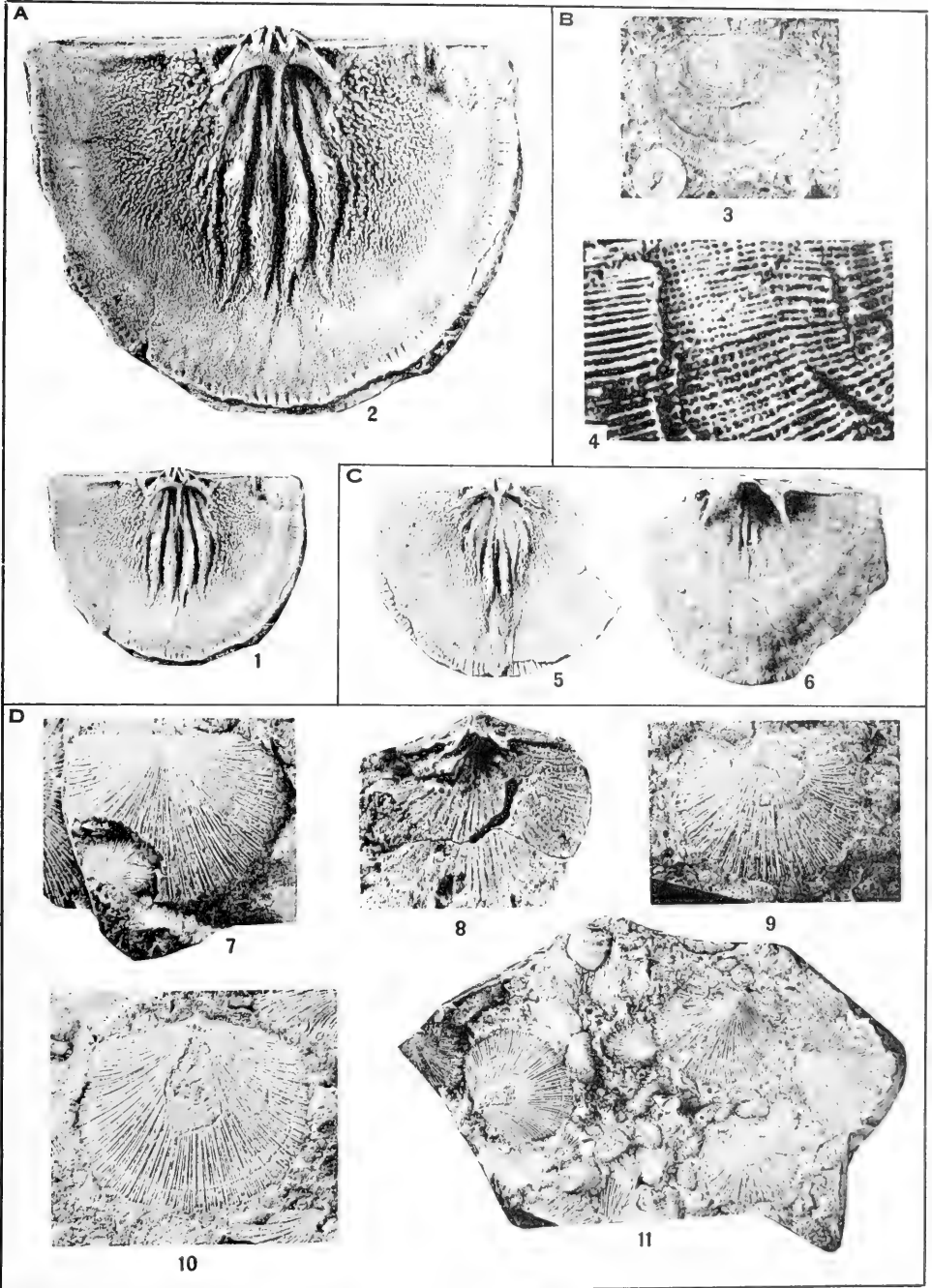
STROPHOMENA, TRIGRAMMARIA

(SEE EXPLANATION OF PLATES.)



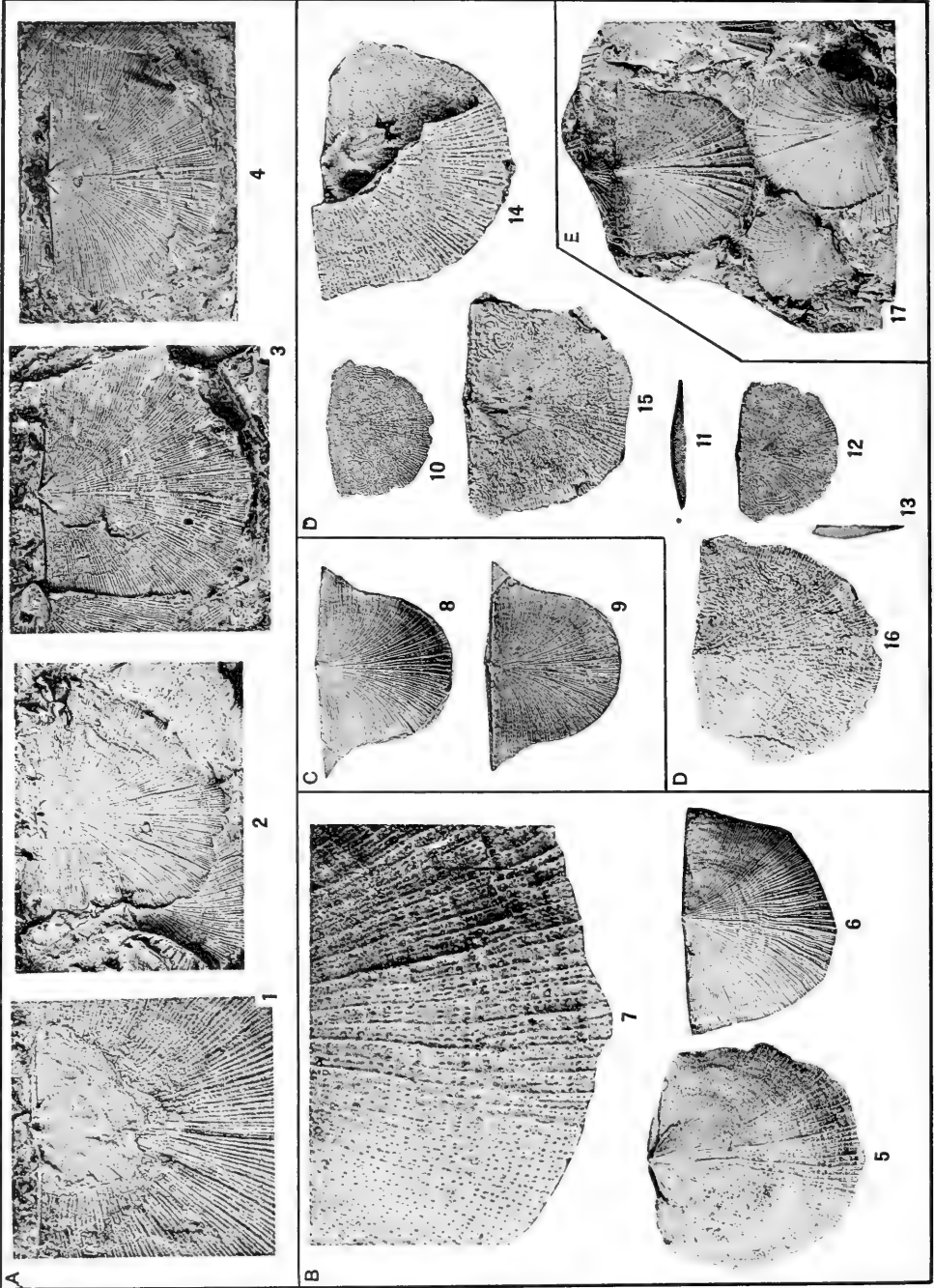
STROPHOMENA

(SEE EXPLANATION OF PLATES.)

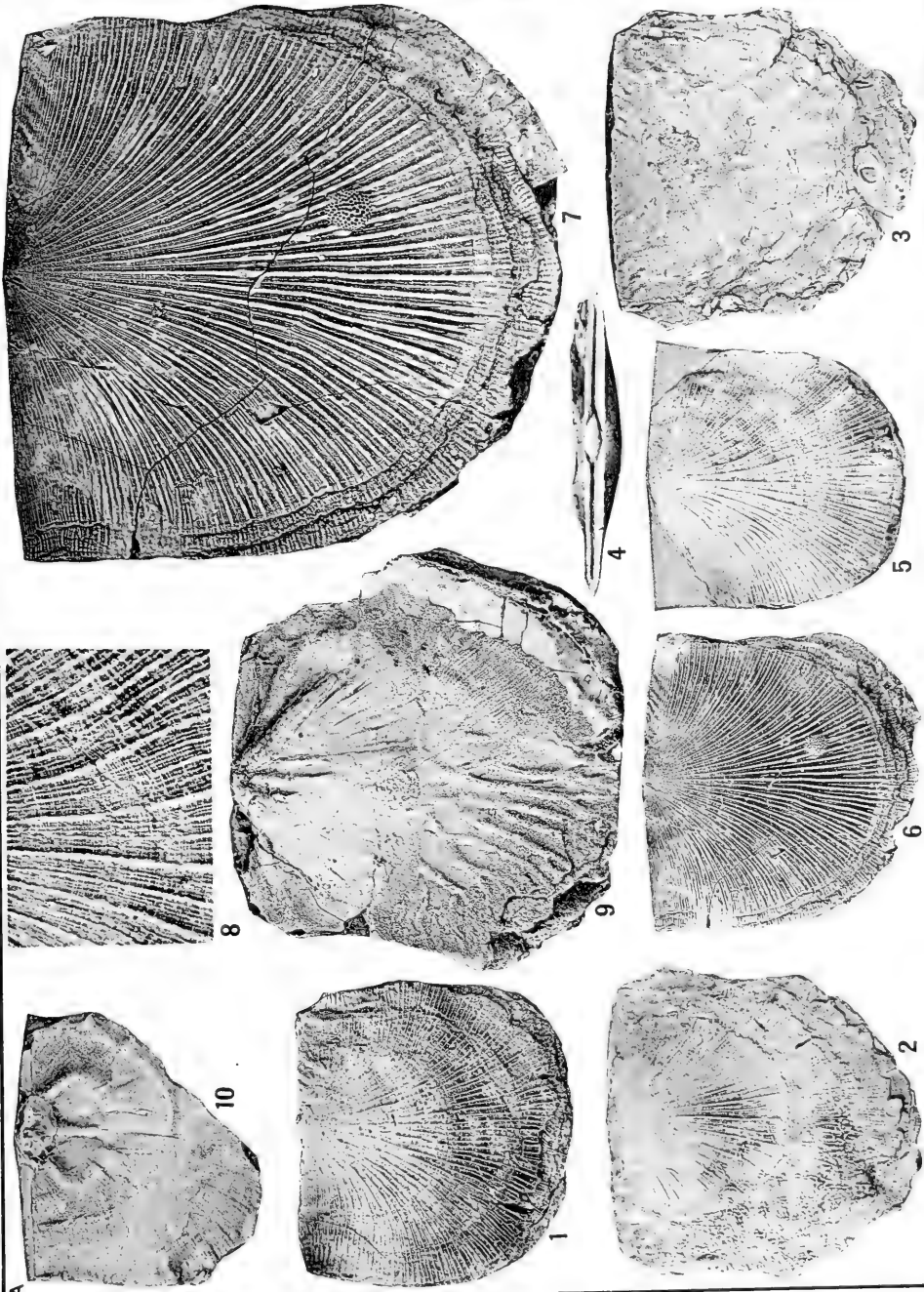


FURCITELLA, PIONOMENA, STROPHOMENA

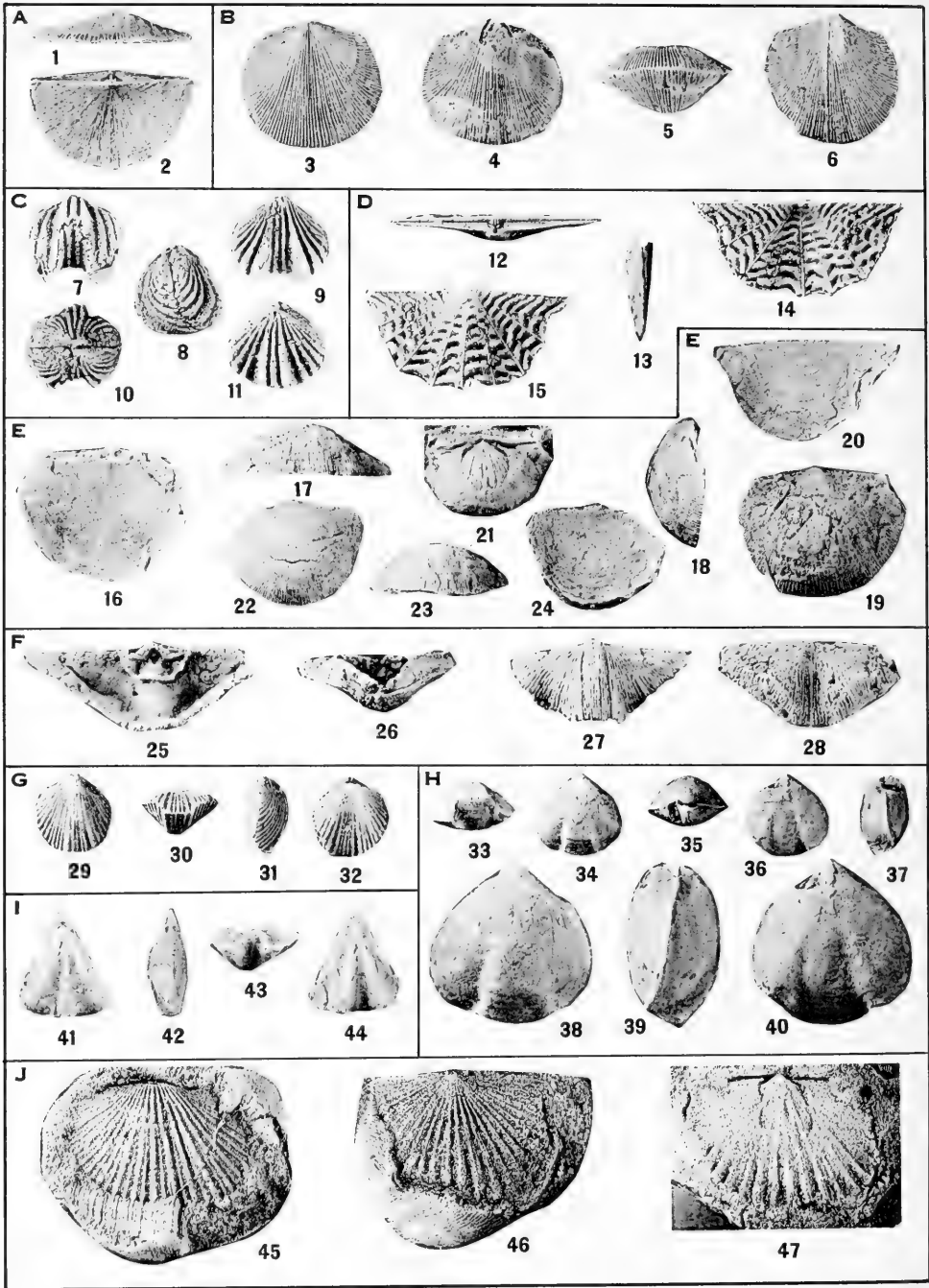
(SEE EXPLANATION OF PLATES.)



PLATYMERIA BAERESQULINA



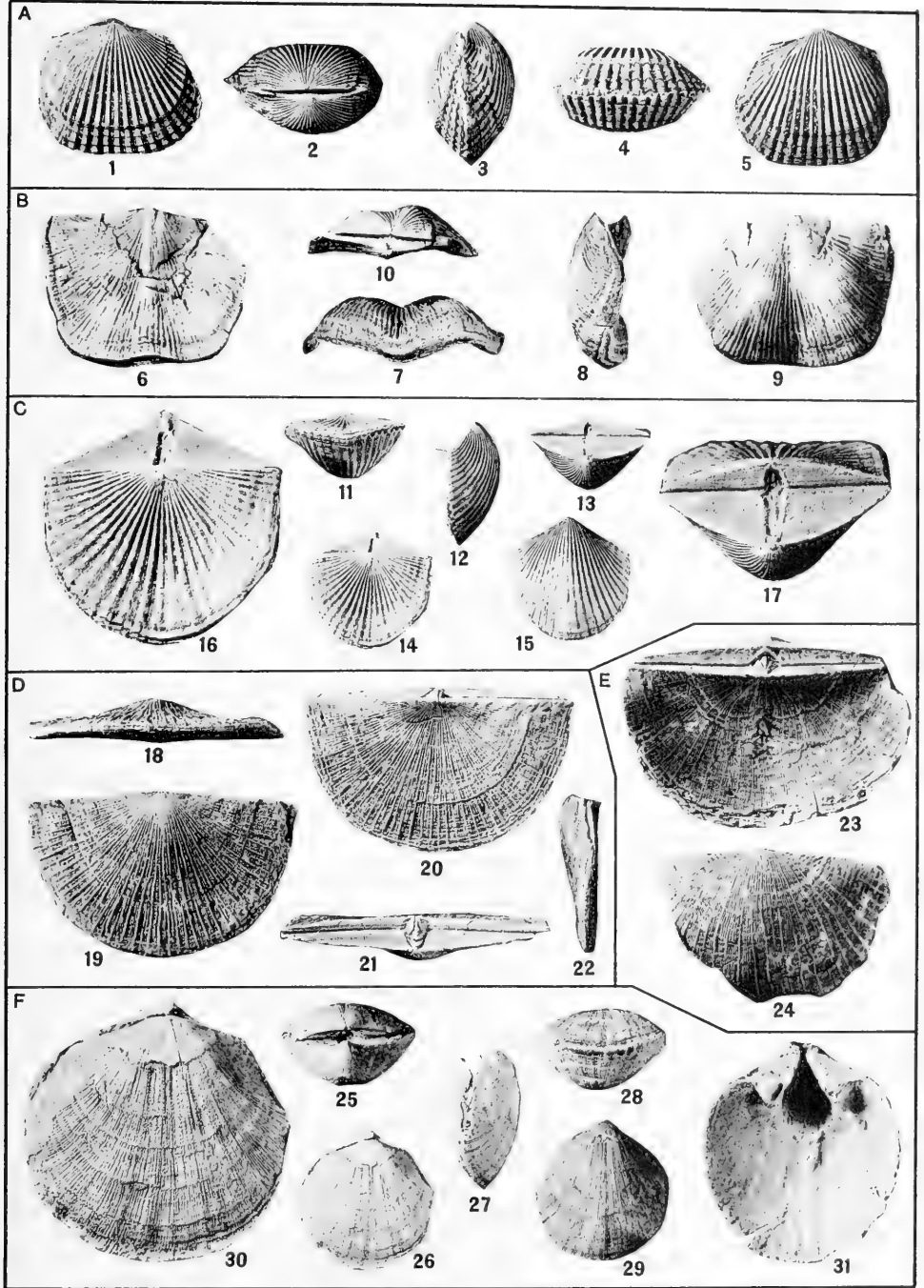
COLAPTOMENA  
(SEE EXPLANATION OF PLATES.)



DINORTHIS, FASCIFERA, OLIGORHYNCHIA, ÖPIKINA, PLECTOCAMARA  
 PTYCHOGLYPTUS, SOWERBYELLA, STENOCAMARA, XENAMBONITES, ZYGOSPIRA,

(SEE EXPLANATION OF PLATES.)





EOPLECTODONTA, HESPERORTHIS, PAURORTHIS, PLECTORTHIS, REUSCHELLA, SOWERBYELLA

(SEE EXPLANATION OF PLATES.)













SMITHSONIAN INSTITUTION LIBRARIES



3 9088 01421 5156