

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

BULLETIN No. 122

**DEVONIAN AND CARBONIFEROUS  
BRACHIOPODS FROM THE  
BONAPARTE GULF BASIN,  
NORTHWESTERN AUSTRALIA**

BY

JOHN ROBERTS

Volume 2.

---

*Issued under the Authority of the Hon. R. W. Swartz, M.B.E., E.D.*

*Minister for National Development*

1971

ISBN 0 642 98380 1

*Published by the Bureau of Mineral Resources, Geology and Geophysics  
Canberra, A.C.T.*

*Printed by Mercury-Walch Pty Ltd, 5-7 Bowen Road, Moonah, Tasmania.*



## PLATE 1

### *Rhipidomella michelini?* (Léveillé)

(Figures 1-5 from locality 107/7, Utting Calcarene, Utting Gap, All  $\times 0.8$ .)

#### Figures

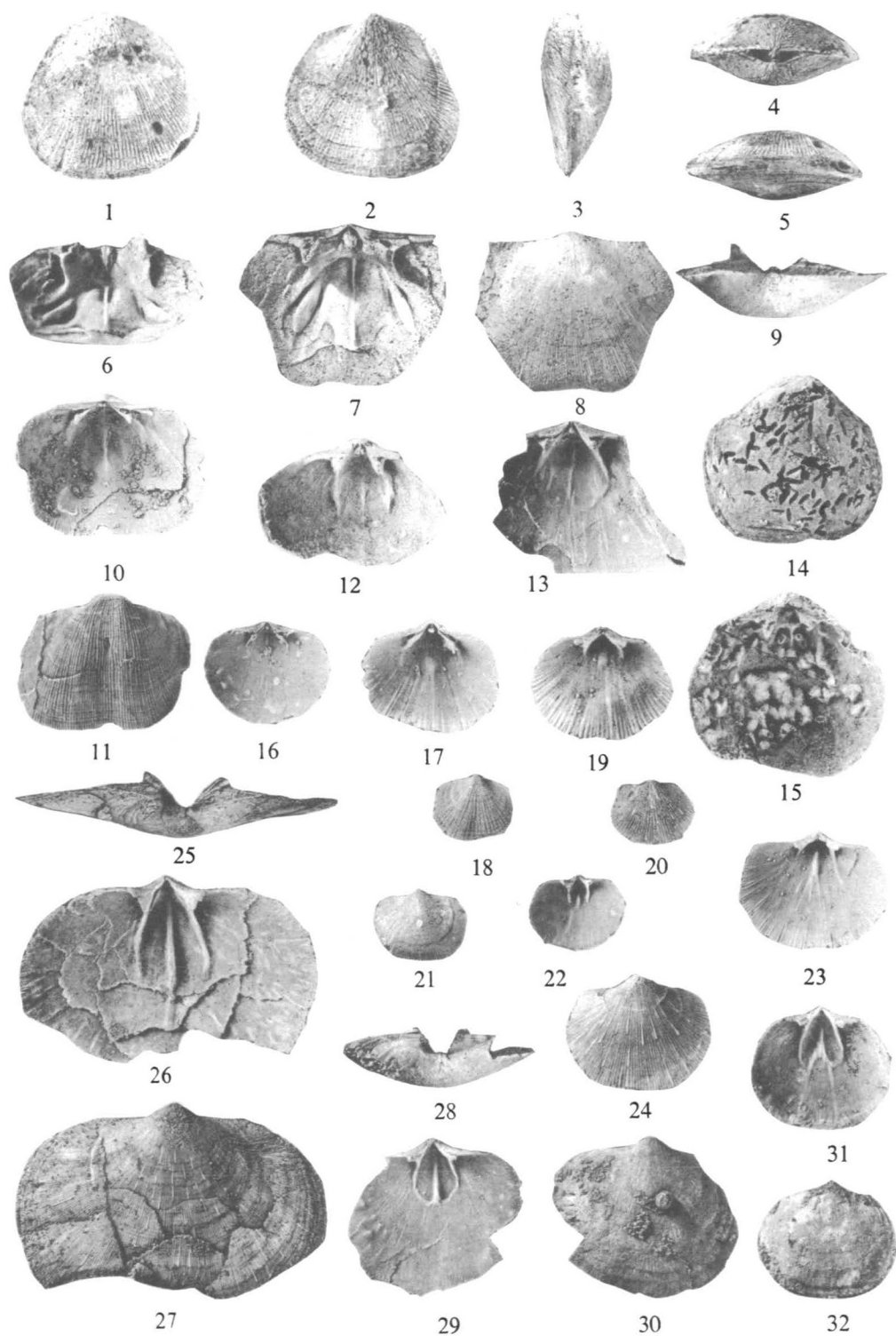
- 1-5. Dorsal, ventral, lateral, posterior, and anterior views of a nearly undistorted specimen. CPC 10790.

### *Schizophoria* sp. cf. *S. resupinata* (Martin)

(Figures 6-32 from the Utting Calcarene, Utting Gap.)

#### Figures

- 6-9. Interior and exterior of a silicified brachial valve. Fig. 6 is viewed from the front, and Fig. 9 from the posterior. Note the stalk-like median lobes on the cardinal process, and the two pairs of adductor muscle scars. CPC 10795, locality 108/0;  $\times 1$ .
- 10, 11. Internal and external views of a silicified brachial valve. Note the convexity and the median sinus. CPC 10796, locality 108/0;  $\times 1$ .
12. Silicified brachial valve interior. CPC 10797, locality 108/0;  $\times 1$ .
13. Broken silicified brachial valve interior. CPC 10798, locality 108/3;  $\times 1$ .
- 14, 15. External and internal views of a brachial valve. While the specimen was being bored externally it secreted pustules of shell material on the inner surface of the valve. CPC 10799, locality 108/3;  $\times 0.8$ .
16. Silicified brachial valve interior showing well-defined mantle canals. CPC 10800, locality 108/0;  $\times 1$ .
- 17, 18. Internal and external views of a juvenile brachial valve. CPC 10801, locality 108/0; Fig. 17  $\times 4$ , Fig. 18  $\times 2$ .
- 19, 20. Internal and external views of a silicified juvenile pedicle valve. CPC 10802, locality 108/0; Fig. 19  $\times 4$ , Fig. 20  $\times 2$ .
- 21, 22. Exterior and interior of a silicified pedicle valve. CPC 10803, locality 108/3;  $\times 1$ .
- 23, 24. Interior and exterior of a silicified pedicle valve showing strong follicular grooves on the interior in the same positions as elevated primary costellae on the exterior. CPC 10804, locality 108/0;  $\times 2$ .
- 25-27. Posterior, interior, and exterior of a silicified pedicle valve. Note the raised hollow costellae on the exterior. CPC 10805, locality 108/0;  $\times 1$ .
- 28-30. Posterior, interior, and exterior views of a silicified pedicle valve. Note the mantle canals arising from the anterior extensions of the dental plates. CPC 10806, locality 108/3;  $\times 1$ .
- 31, 32. Interior and exterior of a silicified pedicle valve. CPC 10807, locality 108/3;  $\times 1$ .



## PLATE 2

### *Rhipidomella michelini?* (Léveillé)

(Figures 1-5 from locality 107/7, Utting Calcarene, Utting Gap. All  $\times 0.8$ .)

#### Figures

- 1, 2. Ventral and dorsal views of a compressed specimen. CPC 10791.
3. Brachial valve interior. CPC 10792.
4. Pedicle valve interior. CPC 10793.
5. Brachial valve interior. Note the myophore on the cardinal process. CPC 10794.

### *Schuchertella* sp. cf. *S. gratillica* Veevers

(Figures 6-10 from locality 141/1, Ningbing Limestone (back-reef), Ningbing Range, and Figures 11-15 from locality 28/10, Kununurra Member of the Cockatoo Formation, Matheson Ridge. Specimens  $\times 1$  unless otherwise indicated.)

#### Figures

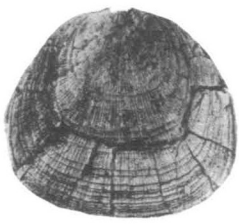
6. Interior of a brachial valve and the inner surface of the ventral interarea of a specimen preserved in limestone. CPC 8476.
7. Pedicle valve exterior. CPC 8474.
8. Brachial valve exterior. CPC 8478.
9. Pedicle valve exterior. CPC 8472.
10. Brachial valve exterior. CPC 8473.
11. Internal mould in friable sandstone of a brachial valve. CPC 8479,  $\times 2$ .
12. Rubber cast showing the exteriors of two brachial valves, and the interiors of a brachial and a pedicle valve. CPC 8480.
13. Rubber cast of a pedicle valve exterior. CPC 8471.
- 14, 15. Rubber cast showing the ventral interarea and the exterior of the brachial valve. CPC 8475.

### *Schellwienella weaberensis* Thomas

(Figures 16-19 from locality 306, Burvill Beds, Point Burvill, and Figures 20-25 from the Point Spring Sandstone, 265 feet above the base of section 436, 2.5 miles east-northeast of Point Spring.)

#### Figures

- 16, 17. Internal moulds of two pedicle valves showing the anterior extensions of the dental plates, and the ventral muscle field. CPC 10808, CPC 10809; both  $\times 0.8$ .
18. Internal mould of a brachial valve. CPC 10810,  $\times 0.8$ .
19. Internal mould of a small brachial valve showing socket plates nearly parallel with the hinge. CPC 10811,  $\times 1.6$ .
20. Rubber cast of a brachial valve interior showing a strong median septum. CPC 10812,  $\times 0.8$ .
- 21, 22. Rubber cast of a brachial valve exterior showing the two external lobes of the cardinal process, and the chilidium. CPC 10813,  $\times 0.8$  and  $\times 3$ .
23. Internal mould of a pedicle valve. CPC 10814,  $\times 1$ .
24. Rubber cast of a brachial valve exterior. CPC 10815,  $\times 0.8$ .
25. Rubber cast of a pedicle valve exterior. CPC 10816,  $\times 1$ .



1



2



3



4



6



7



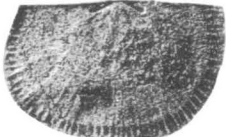
8



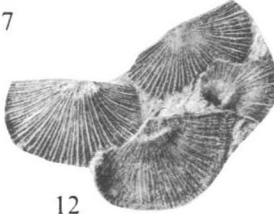
9



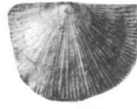
5



11



12



10



15



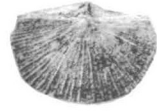
16



20



13



14



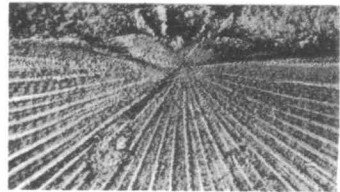
21



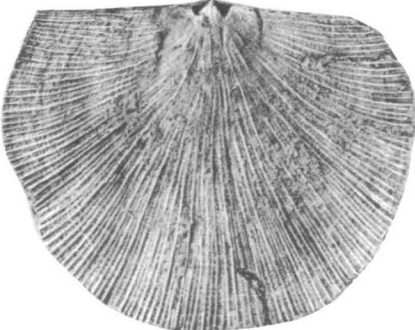
17



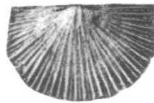
18



22



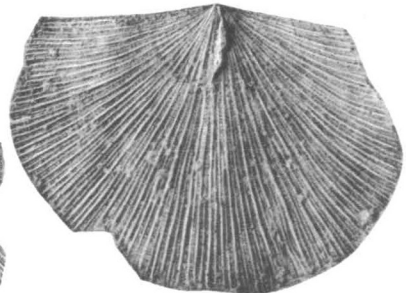
23



19



24



25

### PLATE 3

#### *Serratocrista* sp.

(Figures 1-9 from locality 108/0, Utting Calcarenite, Utting Gap,  $\times 2$ , unless otherwise indicated.)

##### Figures

- 1, 2. External and internal views of a silicified brachial valve. Note the impressed muscle field. CPC 10817.
- 3-5. External, internal, and posterior views of a brachial valve. The muscle field is divided by a median ridge. CPC 10818; Fig. 5  $\times 6$ .
- 6, 7. Exterior and interior of a pedicle valve. CPC 10819.
- 8, 9. Exterior and interior of part of a silicified brachial valve. Note the spinose external ornament, and the pitted inner surface of the valve. CPC 10820.

#### *Schuchertella peltata* sp. nov.

(Figures 10-19 from locality 101/2, Burt Range Formation, Burt Range area.  $\times 1$  unless otherwise indicated.)

##### Figures

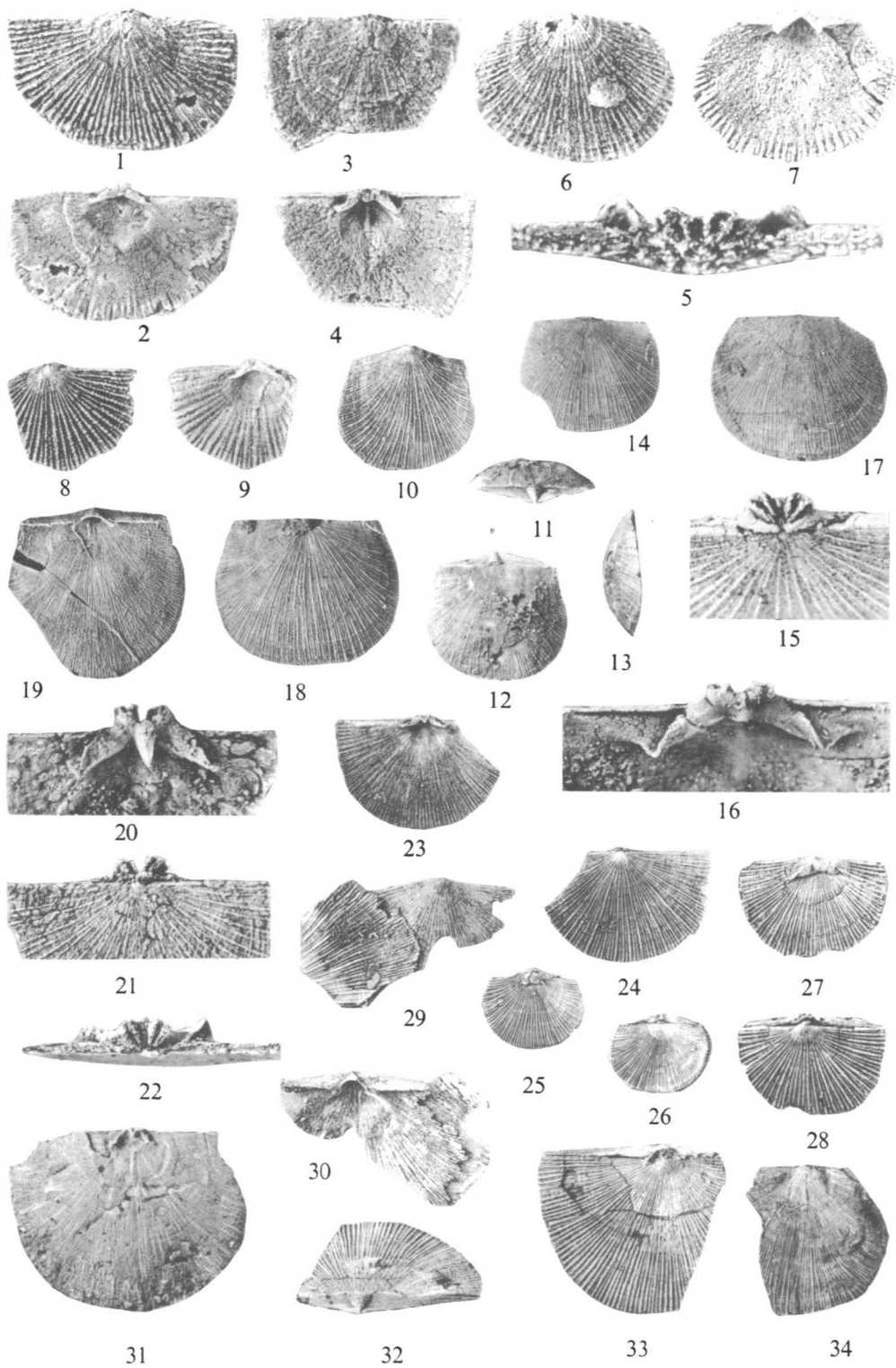
- 10-13. Ventral, posterior, dorsal, and lateral views of the holotype. CPC 8465.
- 14-16. Silicified brachial valve showing the exterior, and details of the outer and inner faces of the cardinal process. CPC 8569, paratype. Figs 15 and 16  $\times 6$ .
- 17, 18. Silicified brachial valve exteriors. CPC 8466 and CPC 8467; both paratypes.
- 19. Silicified pedicle valve interior. CPC 8468, paratype.

#### *Schuchertella dorsiplana* Thomas

(Figures 20-30 from locality 129/4, Burt Range Formation, southeastern end of Enga Ridge.)

##### Figures

- 20-22. Internal, external, and posterior views of the cardinal process. CPC 8322,  $\times 3$ .
- 23, 24. Interior and exterior of a silicified brachial valve. CPC 8324,  $\times 2$ .
- 25, 26. Ventral and dorsal views of a compressed silicified specimen. CPC 8461,  $\times 1$ .
- 27, 28. Ventral and dorsal views of a compressed silicified specimen. CPC 8462,  $\times 2$ .
- 29, 30. External and internal views of a broken pedicle valve. CPC 8463,  $\times 1$ .
- 31. Brachial valve interior. CPC 8464; locality 103/17B, Burt Range Formation, middle part of Enga Ridge;  $\times 1$ .
- 32, 33. Posterior and dorsal views of a silicified specimen. CPC 8321; locality 102/4, Enga Sandstone, northern end of Enga Ridge;  $\times 1$ .
- 34. Brachial valve exterior which is slightly convex anteriorly. CPC 8323; locality 102/4;  $\times 1$ .



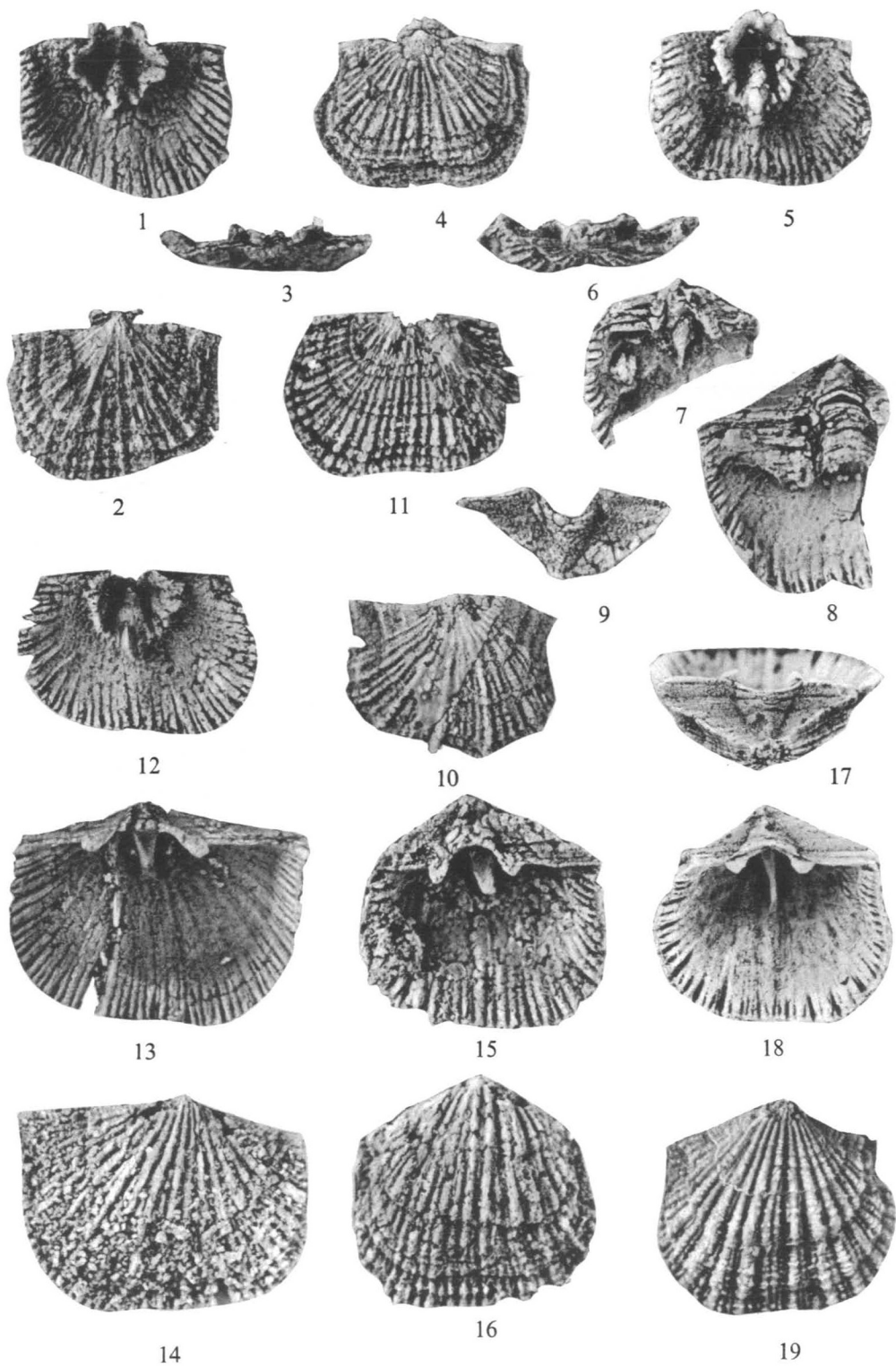
## PLATE 4

### *Dorsoscyphus spinulosus* gen. et sp. nov.

(Figures 1-16 from locality 108/0, and Figures 17-19 from locality 108/3, Utting Calcarenite, Utting Gap. All  $\times 6$ .)

#### Figures

- 1-3. Silicified brachial valve in interior, exterior, and posterior views; note the chevron myophore and the two lateral lobes on the cardinal process, the anterior extensions of the socket plates forming a cup-like muscle platform, and the spinose median septum. CPC 10821, holotype.
- 4-6. Silicified brachial valve in exterior, interior and posterior views. CPC 10822, paratype.
7. Pedicle valve interior showing the connection between the median septum and the inner apical region of the pseudodeltidium. CPC 10823.
8. Silicified pedicle valve with numerous growth halts on the ventral interarea and pseudodeltidium. CPC 10824, paratype.
- 9, 10. Posterior and ventral views of a silicified pedicle valve. CPC 10825.
- 11, 12. External and internal views of a silicified brachial valve; the cardinal process is missing. CPC 10826, paratype.
- 13, 14. Internal and external views of a silicified pedicle valve. CPC 10827.
- 15, 16. Internal and external views of a silicified pedicle valve. CPC 10828, paratype.
- 17-19. Posterior, interior and exterior views of a pedicle valve. Note the lamellose micro-ornament, and the manner of increase of the costellae. CPC 10829.





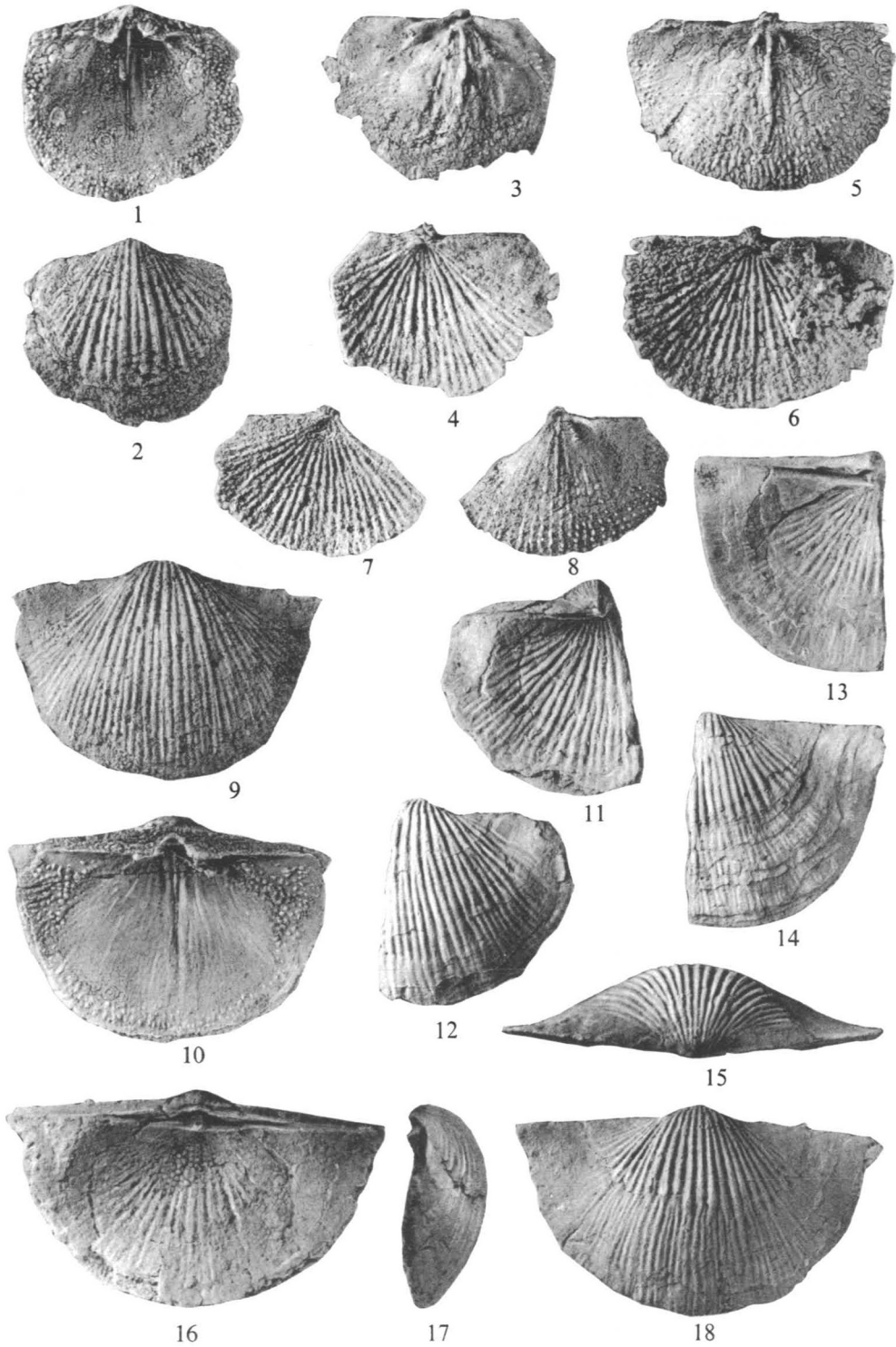
## PLATE 5

### *Schistochonetes abruptus* sp. nov.

(Figures 1-10 from locality 108/0, and Figures 11-18 from locality 107/1, Utting Calcarene, Utting Gap. All  $\times 2$ .)

#### Figures

- 1, 2. Internal and external views of a silicified pedicle valve. CPC 10830, paratype.
- 3-8. Internal and external views of three silicified brachial valves. CPC 10831, 10832, and 10833, respectively; all paratypes.
- 9, 10. External and internal views of a silicified pedicle valve. The change from coarse to fine ornament is not as abrupt as on most specimens. CPC 10834, paratype.
- 11-14. Dorsal and ventral views of two broken paratypes. CPC 10835 and CPC 10836, respectively.
- 15-18. Posterior, dorsal, lateral, and ventral views of the holotype. Note the abrupt change from coarse to fine costellae. CPC 10837.



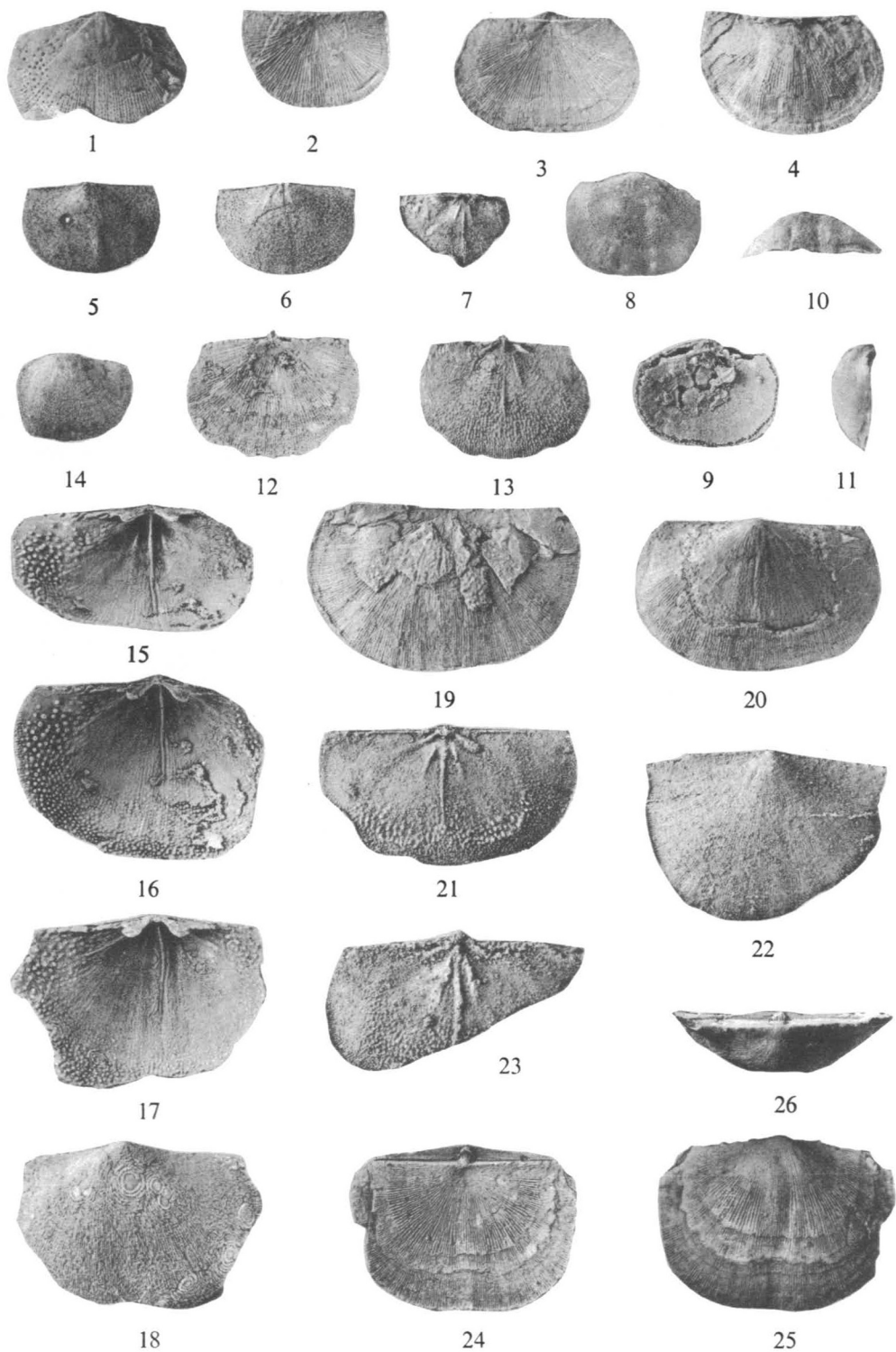
## PLATE 6

### *Rugosochonetes obtectus* sp. nov.

(Specimens  $\times 2$  unless otherwise indicated.)

#### Figures

1. Internal mould of a pedicle valve. CPC 10838; locality 100/13, Burt Range Formation, 6 miles northwest of Mount Septimus.
2. Brachial valve exterior. CPC 10839; locality 100/13.
3. Brachial valve exterior. CPC 10840; locality 100/29.
4. Decorticated brachial valve interior. CPC 10841; locality 100/29.
- 5, 6. Internal moulds of two pedicle valves. CPC 10842 and CPC 10843, respectively; locality 103/9, Burt Range Formation, middle part of Enga Ridge. Both  $\times 1$ .
7. Rubber cast of a brachial valve interior. CPC 10844; locality 122/2, Burt Range Formation, Sandy Creek;  $\times 1$ .
- 8-11. Ventral, dorsal, anterior, and lateral views of the silicified holotype. CPC 10845; locality 128/6, Burt Range Formation, middle part of Enga Ridge;  $\times 1$ .
- 12, 13. Exterior and interior of a silicified brachial valve. CPC 10846, paratype; locality 128/6, Burt Range Formation.
- 14-16. Ventral, dorsal anterior, and dorsal views of a silicified paratype. Note the ridges separating the adductor and diductor muscle scars in Fig. 15. CPC 10847; locality 128/6, Fig. 14  $\times 1$ .
- 17, 18. Internal and external views of a silicified pedicle valve. CPC 10848, paratype; locality 128/6.
19. Decorticated brachial valve interior. CPC 10849; locality 100/28.
20. Decorticated pedicle valve. CPC 10850; locality 100/28.
21. Rubber cast of a brachial valve interior showing the brachial markings. CPC 10851; locality 103/9.
22. Rubber cast of a pedicle valve exterior. CPC 10852; locality 103/9.
23. Rubber cast of a brachial valve interior. CPC 10853; locality 122/2.
- 24-26. Dorsal, ventral, and posterior views. CPC 10854; locality 102/4, Enga Sandstone, northern end of Enga Ridge.



## PLATE 7

### *Rugosochonetes macgregori* sp. nov.

(Figures 1-14 from locality 107/1, Utting Calcarenite, Utting Gap.  $\times 2$  unless otherwise specified.)

#### Figures

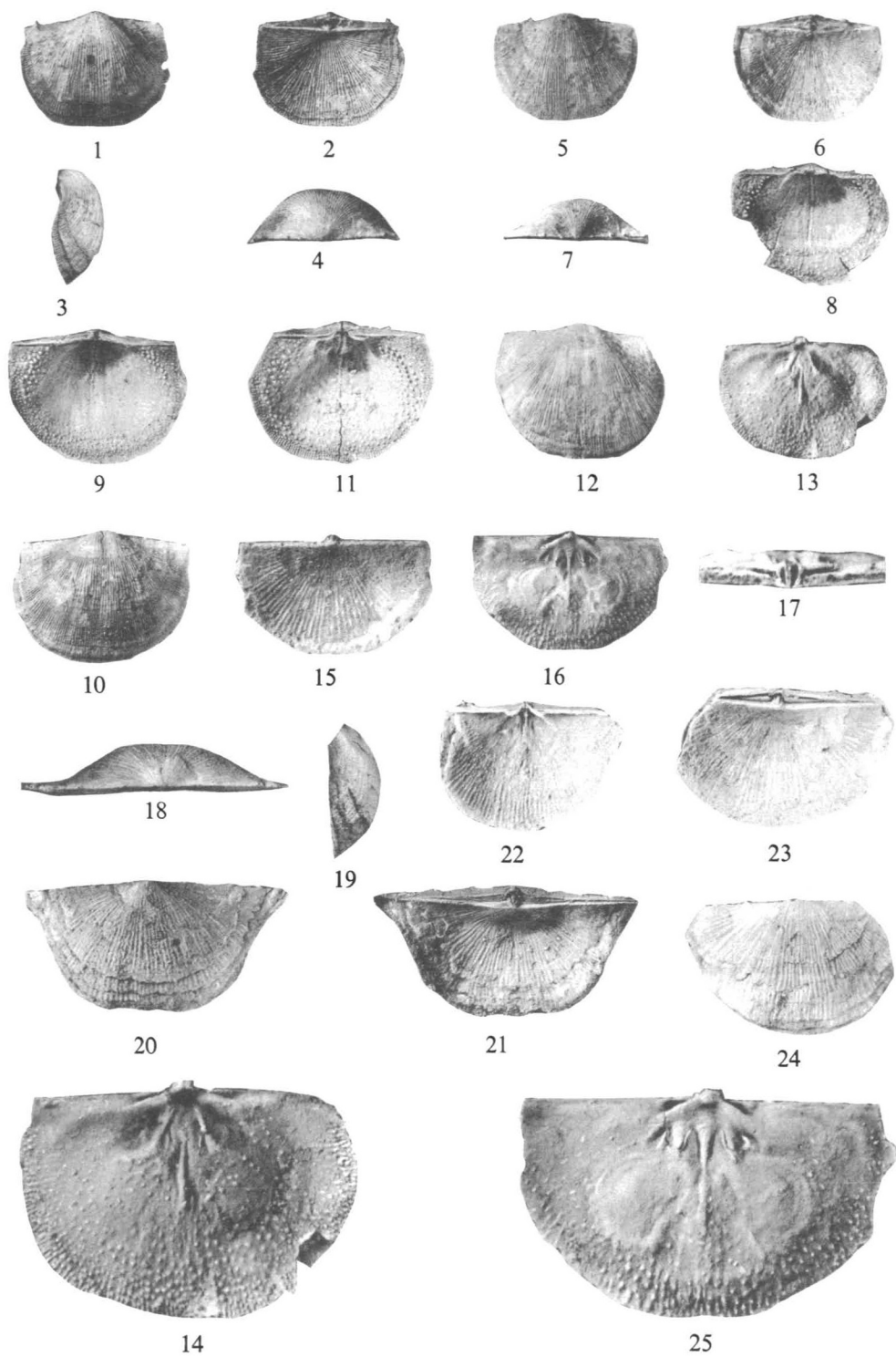
- 1-4. Ventral, dorsal, lateral, and posterior views of the holotype. CPC 10855.
- 5-7. Ventral, dorsal, and posterior views of paratype CPC 10856.
- 8. Pedicle valve interior. CPC 10857, paratype.
- 9, 10. Interior and exterior of a pedicle valve. CPC 10858, paratype.
- 11, 12. Interior and exterior of a pedicle valve. CPC 10859, paratype.
- 13, 14. Brachial valve interior. CPC 10860, paratype. Fig. 14  $\times 4$ .

### *Rugosochonetes ustulatus* sp. nov.

(Figures 15-25 from locality 107/1, Utting Calcarenite, Utting Gap.  $\times 2$  unless otherwise specified.)

#### Figures

- 15-17. External, internal, and posterior views of a brachial valve. CPC 10861, holotype. Fig. 17  $\times 4$ .
- 18-21. Posterior, lateral, ventral, and dorsal views of paratype CPC 10862.
- 22. Pedicle valve interior. CPC 10863, paratype.
- 23, 24. Dorsal and ventral views of a partly broken paratype. CPC 10864.
- 25. Dorsal interior of the holotype showing the robust cardinalia, and the brachial markings. CPC 10861;  $\times 4$ .



## PLATE 8

### *Globosochonetes? mathesonensis* sp. nov.

(Figures 1-10 from locality 28/10, Kununurra Member, Matheson Ridge.  $\times 2$  unless otherwise specified.)

#### Figures

1. Internal mould of a pedicle valve. CPC 10865, paratype.
2. Rubber cast of a pedicle valve exterior. CPC 10866, paratype.
3. Mould showing a brachial valve exterior and a pedicle valve interior. CPC 10867a,b.
4. External mould of a brachial valve. CPC 10868; locality 438/2, Kununurra Member, Abney Hill.
5. External mould of a brachial valve. CPC 10869.
6. Rubber cast of a brachial valve interior. CPC 10870, paratype;  $\times 4$ .
- 7, 8. Rubber cast and mould showing the pedicle and brachial valve interiors. Note the twin septa in the brachial valve. CPC 10871, holotype.
- 9, 10. External moulds of two brachial valves. CPC 10872a,b; Fig. 10 is CPC 10872 a,  $\times 4$ ; locality 438/2, Kununurra Member, Abney Hill.

### *Rugosochonetes* sp. cf. *R. kennedyensis* Maxwell

(Figures 11-22 from locality 453/5, Burvill Beds, Burvill Point. All  $\times 4$ .)

#### Figures

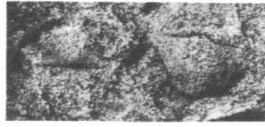
11. Rubber cast of a pedicle valve exterior. CPC 10873.
12. Rubber cast of a brachial valve exterior. CPC 10874.
13. Rubber cast of a pedicle valve exterior. CPC 10875.
14. Rubber cast of a brachial valve interior. CPC 10876a.
- 15, 16. Rubber cast of two brachial valve exteriors. CPC 10877 and CPC 10878, respectively.
- 17, 18. Rubber cast of two brachial valve interiors. CPC 10879 and CPC 10880, respectively.
19. Rubber cast of a pedicle valve interior. CPC 10876b.
- 20-22. Internal mould of three pedicle valve interiors. CPC 10881, CPC 10882, and CPC 10883, respectively.



1



2



3



4



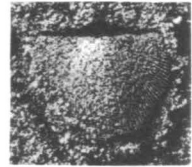
5



7



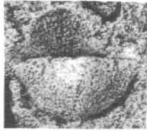
9



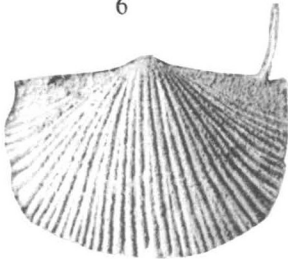
10



6



8



11



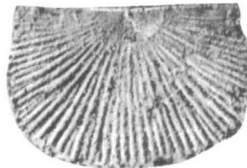
12



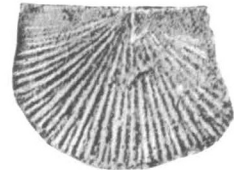
13



14



15



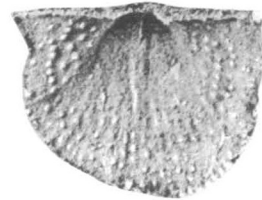
16



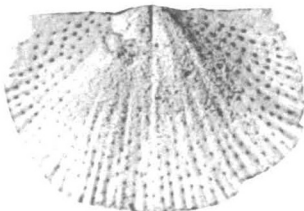
17



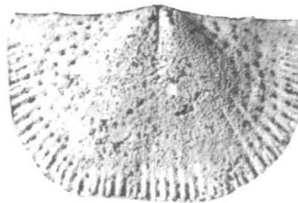
18



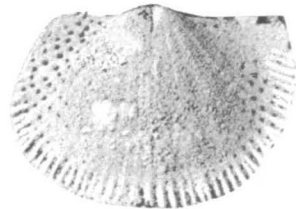
19



20



21



22



## PLATE 9

### *Globosochonetes burvillensis* sp. nov.

(Figures 1-8 from locality 305/1, Burvill Beds, 1.5 miles northeast of Ningbing Homestead)

#### Figures

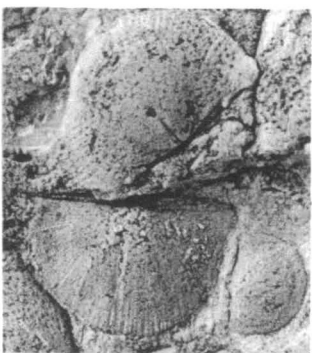
1. Internal moulds of three pedicle valves. CPC 10884a,b,c; paratypes.  $\times 2$ .
- 2, 3. Moulds showing the interior of pedicle valves and the exterior of a brachial valve. CPC 10885a,b,c; paratypes. Fig. 2  $\times 2$ , Fig. 3  $\times 4$ .
4. Rubber cast showing the exterior of a pedicle valve, and two brachial valve interiors. CPC 10886a,b,c; paratypes.  $\times 4$ .
5. Rubber cast of a pedicle valve exterior. CPC 10886d; holotype.  $\times 4$ .
6. Rubber cast of two pedicle valve exteriors. CPC 10887a,b; paratypes.  $\times 4$ .
- 7, 8. Rubber cast showing the interior of three brachial valves, and a pedicle valve exterior. CPC 10888a,b,c,d; paratypes. Fig. 7  $\times 2$ , Fig. 8  $\times 4$ .



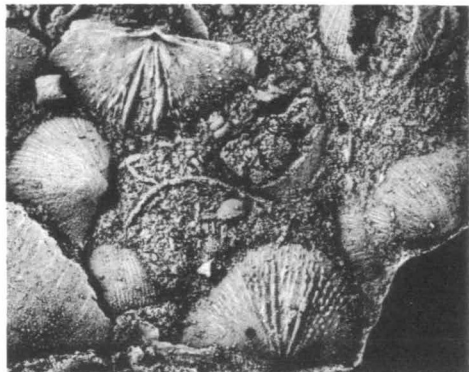
1



2



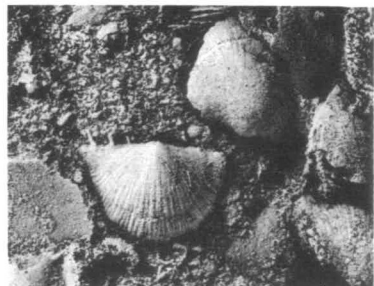
3



4



6



5



7



8

## PLATE 10

### Chonetidid gen. et sp.

(Figures 1-10 from locality 102/4, Enga Sandstone, northern end of Enga Ridge. All  $\times 2$ .)

#### Figures

- 1-4. Ventral, dorsal, lateral, and posterior views of CPC 10889.
- 5-7. Ventral, dorsal, and posterior views of CPC 10890.
- 8-10. Posterior, dorsal, and ventral views of CPC 10891.

### *Megachonetes zimmermanni* (Paeckelmann)

(Figures 11-22 from locality 108/7, Burvill Beds, Utting Gap.  $\times 1$  unless otherwise specified.)

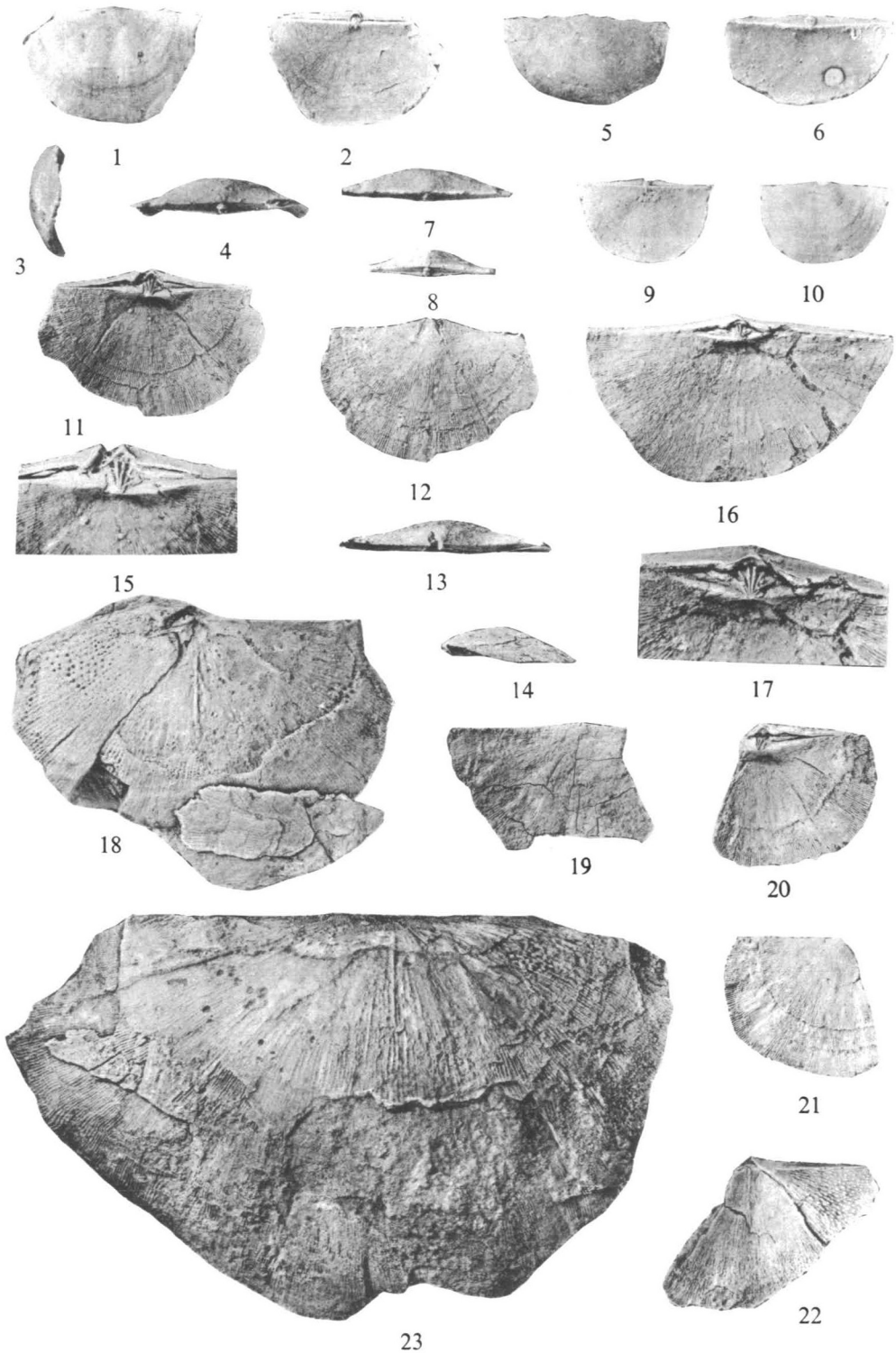
#### Figures

- 11-15. Dorsal, ventral, posterior, and lateral views, and a closer view of the dorsal umbo of CPC 10892. Fig. 15  $\times 2$ .
- 16, 17. Dorsal exterior, and a closer view of the dorsal umbo of CPC 10893. Fig. 17  $\times 2$ .
- 18. Partly decorticated brachial valve interior. CPC 10894.  $\times 2$ .
- 19. Crushed pedicle valve exterior. CPC 10895.
- 20, 21. Dorsal and ventral views of CPC 10896.
- 22. Pedicle valve interior. CPC 10897.

### *Delepinea uttingi* Thomas

#### Figure

- 23. Decorticated brachial valve interior. CPC 10898, locality 108/7, Burvill Beds, Utting Gap.  $\times 1$ .

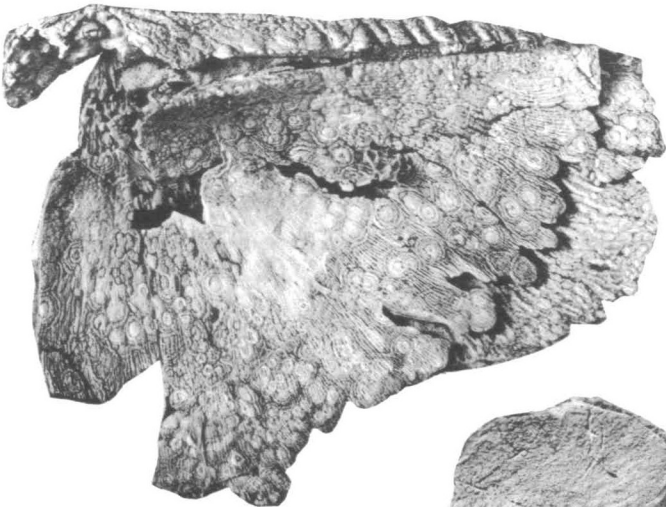


## PLATE 11

### *Delepinea uttingi* Thomas

#### Figures

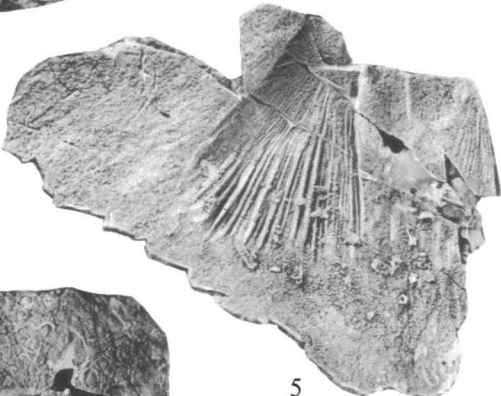
- 1-3. Dorsal, posterior, and ventral views of a large silicified specimen. CPC 10899; locality 107/6A, Utting Calcarenite, Utting Gap.  $\times 1$ .
4. Part of a pedicle valve interior showing the muscle field. CPC 10900; locality 108/7, Burvill Beds, Utting Gap.  $\times 1$ .
5. Broken silicified pedicle valve interior. CPC 10901; locality 107/6A.  $\times 1$ .
6. Decorticated pedicle valve. CPC 10902; locality 108/7.  $\times 1$ .
7. Part of a pedicle valve interior showing the dendritic adductor muscle scars, and the striated diductor muscle scars. CPC 10903; locality 108/7.  $\times 1$ .



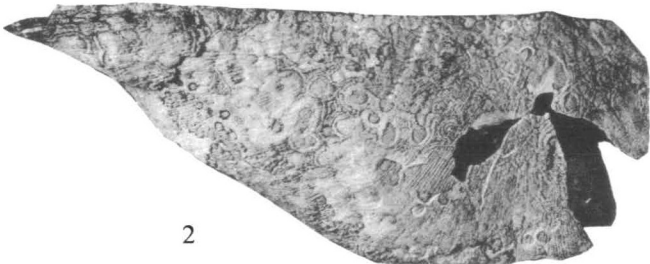
1



4



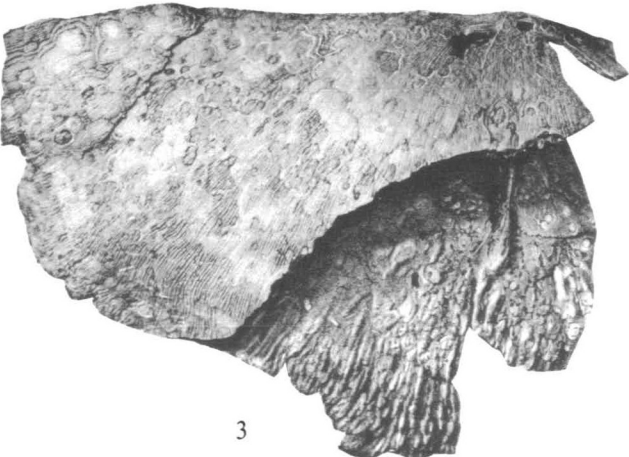
5



2



6



3



7

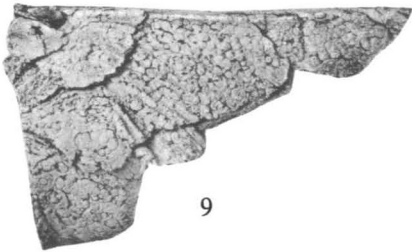
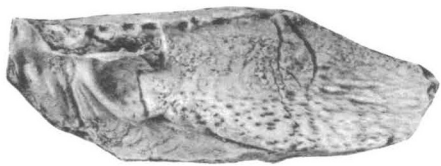
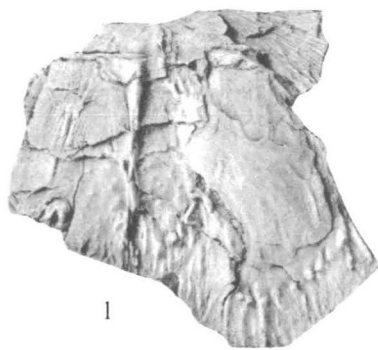
## PLATE 12

### *Delepinea uttingi* Thomas

(Figures 1-8 from locality 108/7, Burvill Beds, Utting Gap.  $\times 1$  unless otherwise specified.)

#### Figures

1. Brachial valve interior showing the muscle field, median septum, papillose brachial ridges, and mantle canals. CPC 10904.
2. Brachial valve interior. CPC 10905.
- 3, 4. Ventral view of the decorticated pedicle valve, and posterior view of the cardinal process and chilidium of CPC 10906.
5. Posterior view of CPC 10902. Note the large chilidium, and the pseudodeltidium extending along the sides of the delthyrium. (See Pl. 11, fig. 6 for a ventral view of the same specimen.)
6. Part of a pedicle valve interior showing a tooth and a subdental cavity. CPC 10907.
7. Decorticated pedicle valve. CPC 10908.
8. Part of a pedicle valve interior showing the muscle field and mantle canals. CPC 10909.
9. Posterolateral part of a pedicle valve showing mantle canals. CPC 10910; locality 107/6A, Utting Calcarenite, Utting Gap.  $\times 1$ .





## PLATE 13

### *Retichonetes arenarius* sp. nov.

(Figures 1-18 from locality 37/2, Westwood Member of the Cockatoo Formation, Westwood Creek.  $\times 2$  unless otherwise specified.)

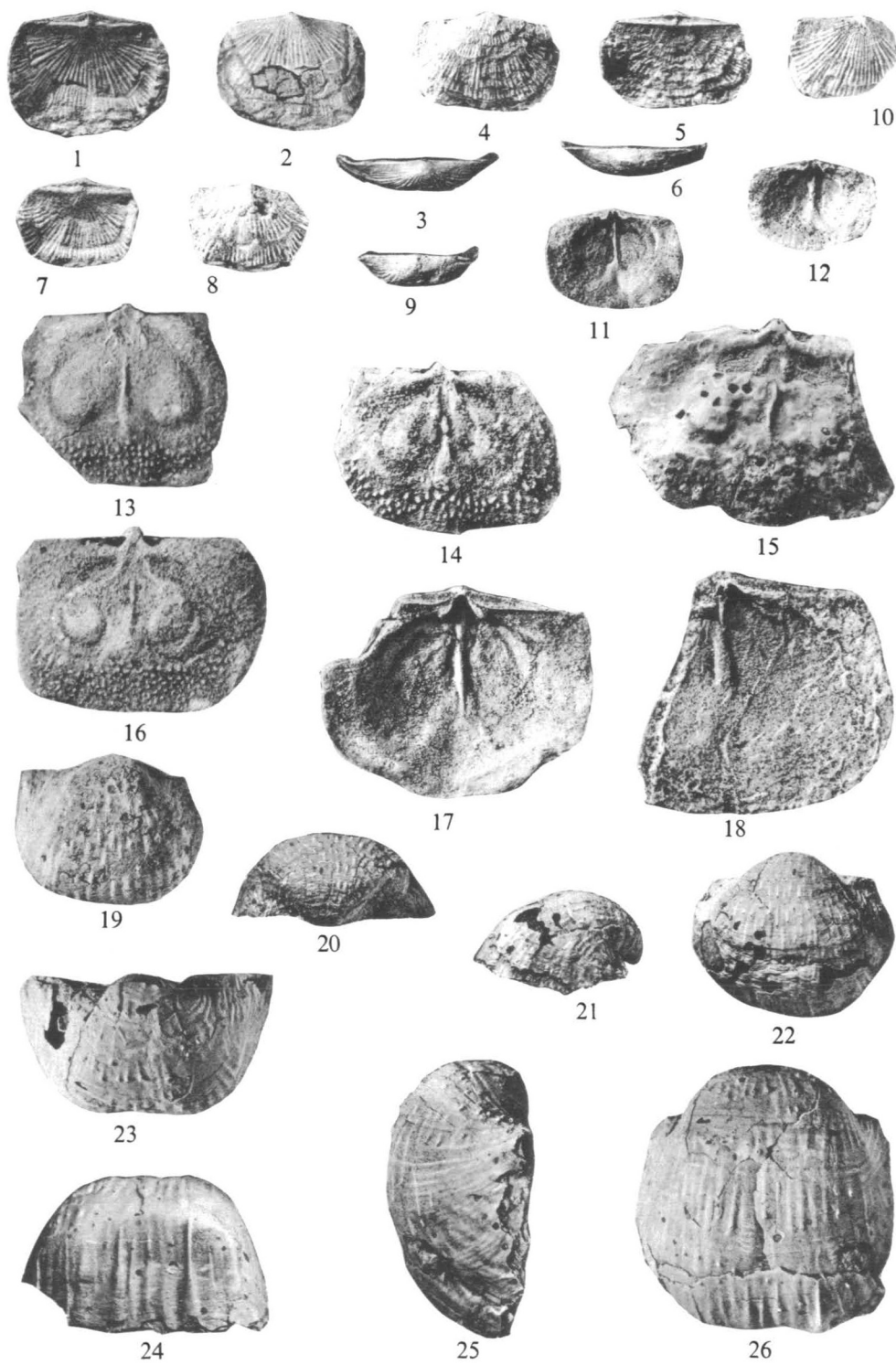
#### Figures

- 1-3. Dorsal, ventral, and posterior views of paratype CPC 10911.
- 4-6. Ventral, dorsal, and posterior views of the holotype. Note the low fold within the ventral sinus. CPC 10912.
- 7-9. Dorsal, ventral, and posterior views of paratype CPC 10913.
- 10. Pedicle valve exterior showing the capillate ornament. CPC 10914, paratype.
- 11, 12. Two pedicle valve interiors showing the deep visceral region outlined by a marginal furrow. CPC 10915 and CPC 10916, both paratypes.
- 13-16. Four brachial valve interiors. Note the moderately well defined brachial markings. CPC 10917, CPC 10918, CPC 10919, and CPC 10920, respectively; all paratypes;  $\times 4$ .
- 17, 18. Two pedicle valve interiors showing the high posterior portion on the median septum. CPC 10921 and CPC 10922, respectively; both paratypes;  $\times 4$ .

### *Rhytiophora* sp. cf. *R. raricostata* (Herrick)

#### Figures

- 19. Pedicle valve exterior. CPC 10923, locality 103/12, Burt Range Formation, middle of Enga Ridge;  $\times 1$ .
- 20-22. Posterior, lateral and ventral views of CPC 10924. Locality 102/4, Enga Sandstone, northern end of Enga Ridge;  $\times 1$ .
- 23-26. Posterior, anterior, lateral, and ventral views of CPC 10925. Locality 102/4;  $\times 1$ .



## PLATE 14

### *Productella westwoodensis* sp. nov.

(Figures 1-16 from locality 13/6, Westwood Member of the Cockatoo Formation, Westwood Creek.  $\times 1$  unless otherwise indicated.)

#### Figures

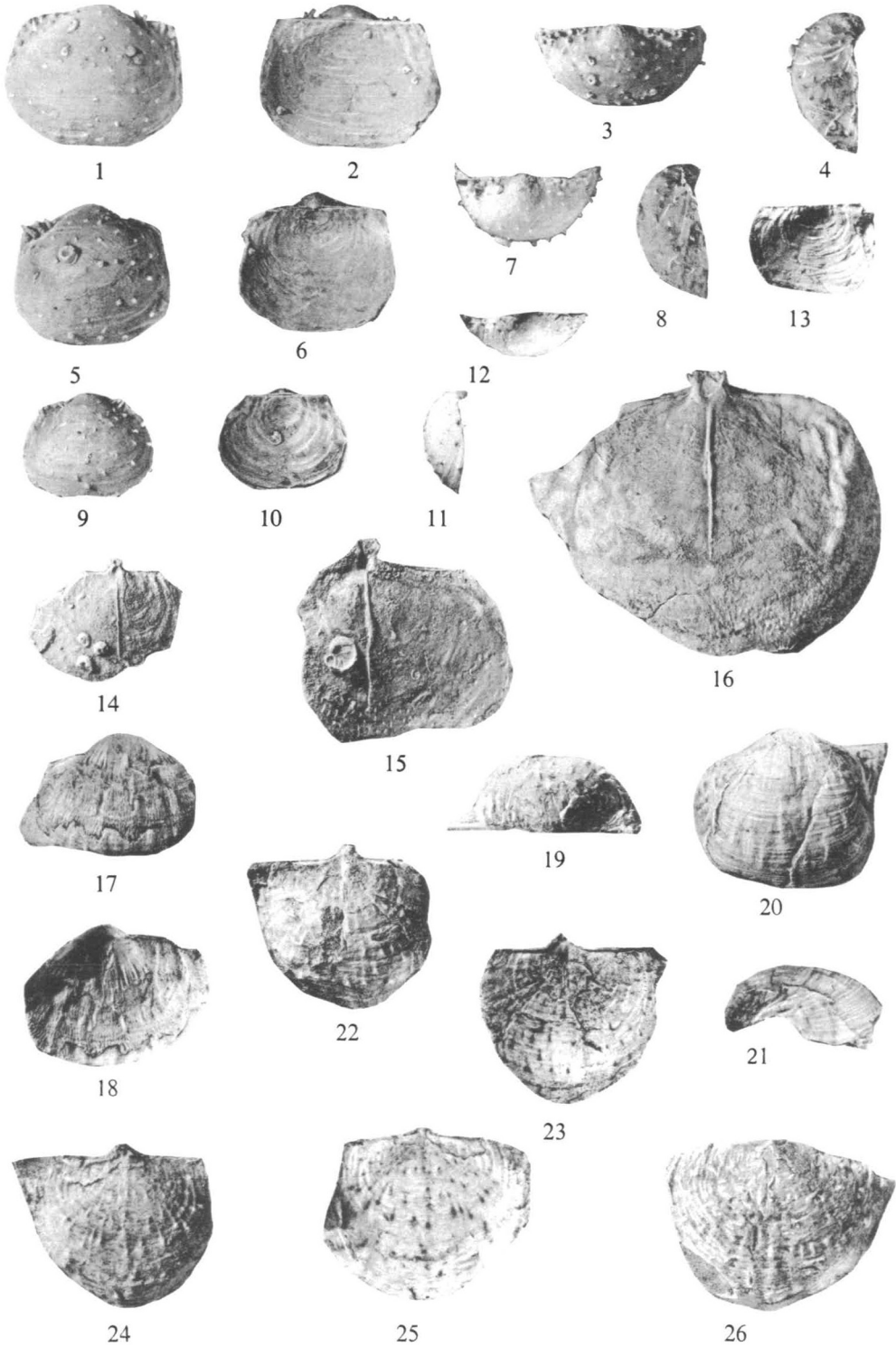
- 1-4. Ventral, dorsal, posterior, and lateral views of the holotype. CPC 8609.
- 5-8. Ventral, dorsal, posterior, and lateral views of paratype CPC 8610.
- 9-12. Ventral, dorsal, lateral, and posterior views of paratype CPC 8611.
- 13. Brachial valve exterior. CPC 8612.
- 14-16. Three brachial valves exteriors. CPC 8613, CPC 8614, and CPC 8615, respectively. Fig. 16 (a paratype) is  $\times 2$ .

### *Mesoplica? jeremiahensis* sp. nov.

(Figures 17-26 from locality 88/5, Ningbing Limestone, Jeremiah Hills. All  $\times 1$ .)

#### Figures

- 17, 18. Rubber cast and mould of CPC 8616 (paratype) showing the ventral muscle field.
- 19-21. Posterior, ventral, and lateral views of the holotype. CPC 8617.
- 22, 23. Partly decorticated dorsal interior, and internal mould of CPC 8618, paratype.
- 24, 25. Partly decorticated dorsal interior, and a rubber cast of the brachial valve exterior. CPC 8618, paratype.
- 26. External mould of the brachial valve showing median plications. CPC 8620, paratype.



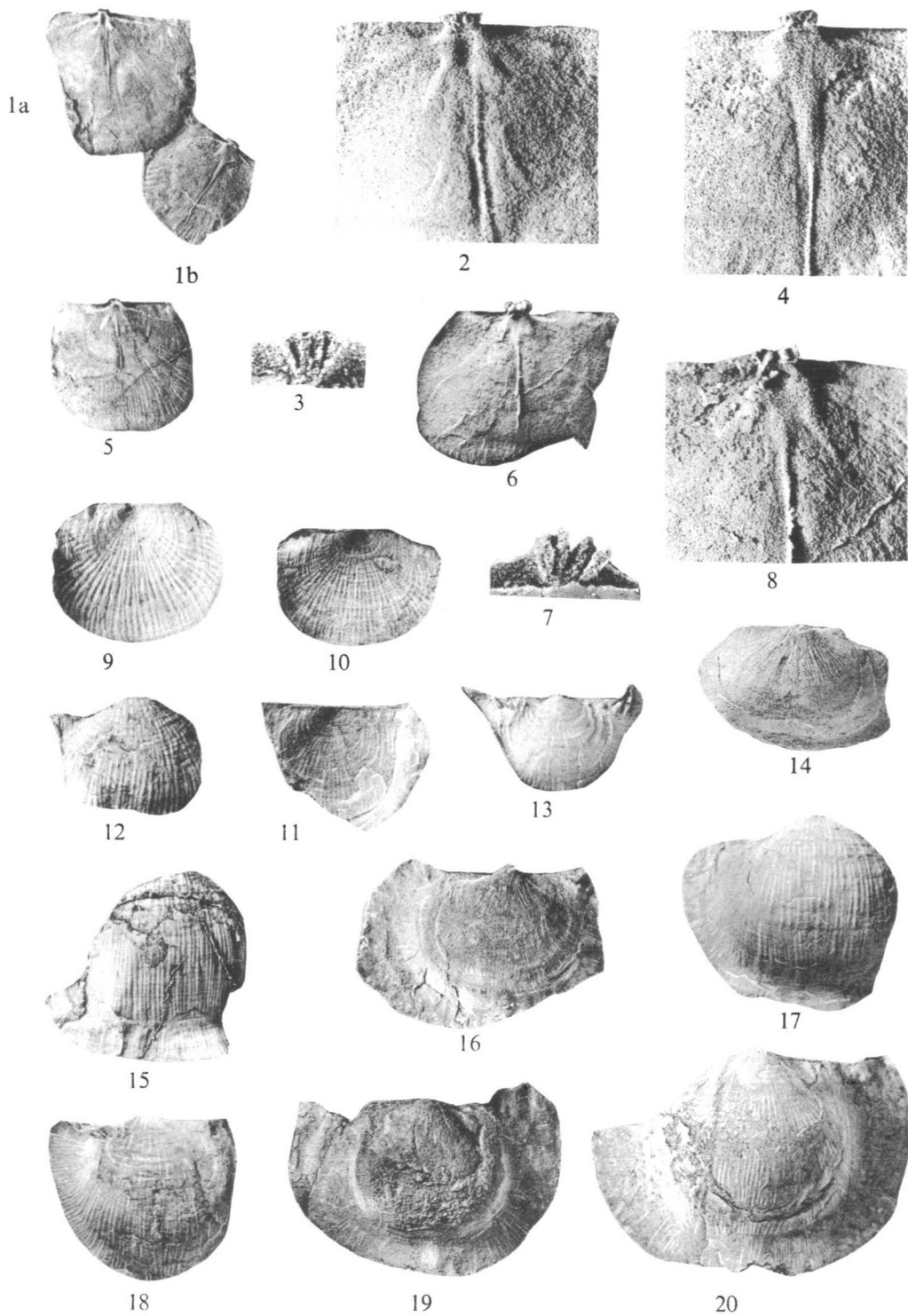
## PLATE 15

### *Lomatiphora aquila* gen. et sp. nov.

(Figures 1-20 from the Burt Range Formation.  $\times 1$  unless otherwise specified.)

#### Figures

- 1a, 1b. Rubber cast of two brachial valve interiors. CPC 8621a, the holotype, and CPC 8621b, a paratype; locality 126/5, Sorby Hills.
- 2, 3. Closer views of the holotype showing the cardinalia and the external face of the cardinal process. CPC 8621a; locality 126/5; Fig. 2  $\times 4$ , Fig. 3  $\times 8$ .
4. Closer view of paratype. CPC 8621b; locality 126/5;  $\times 4$ .
5. Rubber cast of a brachial valve interior. CPC 8622, paratype; locality 126/5.
- 6-8. Rubber cast of a brachial valve interior with closer views of the external face of the cardinal process and the cardinalia. CPC 8623, paratype; locality 126/5.  $\times 1.5$ ,  $\times 8$ , and  $\times 4$ , respectively.
- 9, 10. Rubber casts of two brachial valve exteriors. CPC 8624 and CPC 8625, respectively; locality 100/30, 6.5 miles northwest of Mount Septimus.
11. Brachial valve exterior showing the marginal flange. CPC 8626; locality 100/27.
12. Exterior of a pedicle valve. CPC 8627; locality 100/27.
13. Rubber cast of a pedicle valve posterior showing the hinge spines. CPC 8628, paratype; locality 126/5.
14. Internal mould of a pedicle valve. CPC 8629; locality 115/7, Spirit Hill.
15. Rubber cast of a pedicle valve exterior showing the marginal flange. CPC 8630; locality 100/30.
16. Internal mould of a pedicle valve. CPC 8631; locality 126/5.
17. Pedicle valve exterior. CPC 8632; locality 100/30.
18. Pedicle valve exterior. CPC 8633; locality 101/13, 4.5 miles west of Mount Septimus.
19. Internal mould of a pedicle valve. Note the wide marginal flange. CPC 8634, paratype; locality 126/5.
20. Large pedicle valve exterior. CPC 8635; locality 101/13.



## PLATE 16

### *Leioproductus buttonensis* sp. nov.

(Figures 1-21 from locality 105/620, Buttons Beds, at Buttons Crossing on the Ord River.  $\times 1$  unless otherwise specified.)

#### Figures

- 1-4. Ventral, anterior, lateral, and posterior views of the holotype. CPC 8268.
- 5-7. Ventral, anterior, and lateral views of a pedicle valve. CPC 8287.
- 8-10. Ventral, anterior, and lateral views of paratype CPC 8288.
- 11-13. Ventral, anterior, and lateral views of a pedicle valve. CPC 8289.
- 14. Anterior view of a pedicle valve showing the ridges at the front of the trail. CPC 8290.
- 15. Decorticated pedicle valve showing the muscle field. CPC 8291, paratype.
- 16, 17. Two brachial valves exteriors. Note the brachial markings on Fig. 16. CPC 8292 and CPC 8293, respectively; paratypes;  $\times 1.5$ .
- 18, 19. Two decorticated brachial valve interiors. CPC 8294, a paratype, and CPC 8295, respectively.
- 20. Part of a brachial valve interior. CPC 8296.
- 21. Dorsal view of CPC 8297, paratype.

### *Steinhagella* sp.

(Figures 22-26 from locality 12/3, Westwood Member of the Cockatoo Formation, Westwood Creek.  $\times 1$ .)

#### Figures

- 22. Brachial valve exterior. CPC 8298.
- 23. Pedicle valve exterior. CPC 8299.
- 24. Pedicle valve exterior. CPC 8300.
- 25, 26. Lateral and ventral views of CPC 8301.



1



2



3



4



5



6



7



8



9



11



12



13



10



14



15



16



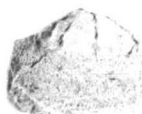
17



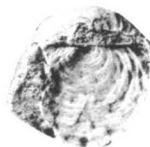
18



19



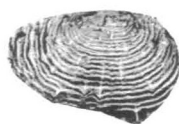
20



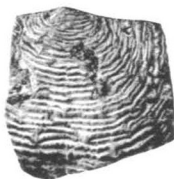
21



22



23



24



25



26



## PLATE 17

### Productacean gen. et sp. B

(Figures 1-10 from locality 146/11, Buttons Beds, 7 miles northwest of Mount Septimus.  
× 1.)

#### Figures

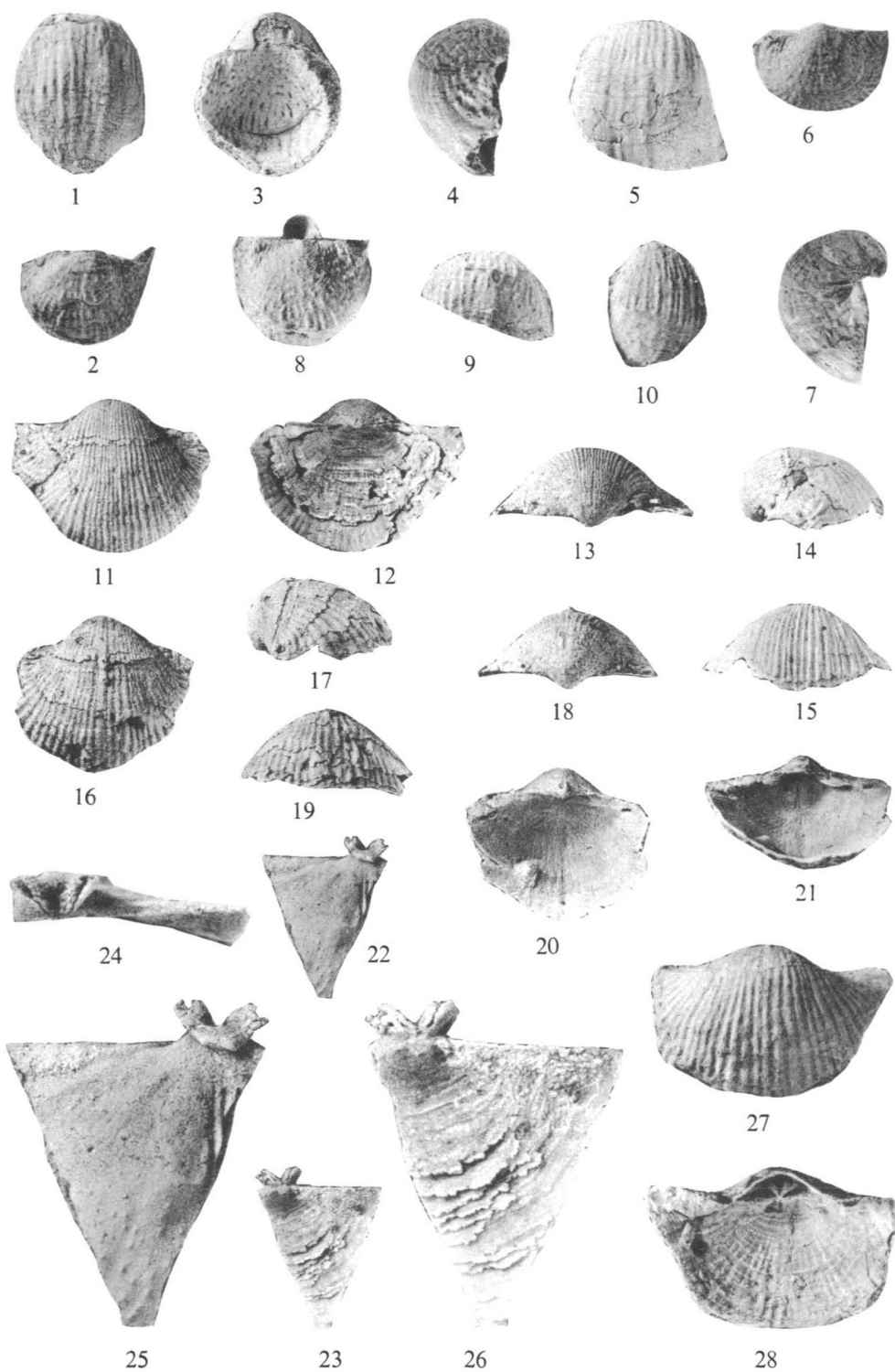
- 1-4. Anteroventral, posterior, dorsal, and lateral views of CPC 8652.
- 5-7. Anteroventral, posterior, and lateral views of a pedicle valve. CPC 8653.
- 8, 9. Dorsal and anterior views of an external mould of a brachial valve. CPC 8654.
- 10. Rubber cast of part of a pedicle valve exterior showing the external ornament. CPC 8655.

### *Productina margaritacea* (Phillips)

(Figures 11-28 from the Utting Calcarenite, Utting Gap. × 1 unless otherwise specified.)

#### Figures

- 11-15. Ventral, dorsal, posterior, lateral, and anterior views of CPC 8656. Locality 107/1.
- 16-21. Ventral, lateral, posterior, anterior, dorsal, and anterodorsal views of CPC 8657. Note the median spines in Fig. 16, and the mantle canals and muscle scars in Figs 20 and 21. Locality 108/0.
- 22-26. Internal, external, and posterior views of part of a brachial valve. CPC 8658; locality 108/0. Figs 22 and 23 × 2; Figs 24-26 × 4.
- 27, 28. Ventral and dorsal views of CPC 8659. Locality 107/7.



## PLATE 18

### *Rhytiophora* sp. cf. *R. calhounensis* (Moore)

(Figures 1-13 from locality 7/1, Tournaisian part of the Ningbing Limestone, Ningbing Range.  $\times 1$  unless otherwise specified.)

#### Figures

- 1-4. Ventral, anterior, lateral, and posterior views of CPC 8570.
- 5-7. Anterior, dorsal interior, and a close up of the cardinal process of CPC 8571. The median septum is stripped away.
- 8, 9. A rubber cast and a pedicle valve exterior. CPC 8572.
- 10, 11. An external mould and a rubber cast of a brachial valve. CPC 8573.
- 12, 13. An internal mould of pedicle valve in ventral and anterior views. CPC 8574.

### Productacean gen. et sp. A

(Figures 14-18 from locality 7/1, Tournaisian part of the Ningbing Limestone, Ningbing Range.  $\times 1$  unless otherwise specified.)

#### Figures

- 14, 15. Pedicle valve exterior, and a close up of its external ornament. CPC 8575. Fig. 15  $\times 4$ .
- 16. External mould of the brachial valve. CPC 8576.
- 17. Brachial valve exterior. CPC 8577.
- 18. External mould of the brachial valve. CPC 8578.

### *Sentosia subquadrata* sp. nov.

(Figures 19-30 are all  $\times 1$ . Figures 22-30 from locality 443/13, Ningbing Limestone, Jeremiah Hills.)

#### Figures

- 19-21. Lateral, posterior, and ventral views of CPC 8579. Locality 11/2, Ningbing Limestone, Ningbing Range.
- 22, 23. Posterior and ventral views of the holotype. CPC 8580.
- 24. Decorticated brachial valve. CPC 8581, paratype.
- 25, 26. Rubber cast and a mould of a brachial valve exterior. CPC 8582, paratype.
- 27. Decorticated brachial valve interior. CPC 8583, paratype.
- 28. Brachial valve exterior. CPC 8584, paratype.
- 29, 30. Rubber cast and a mould of a brachial valve exterior. CPC 8585, paratype.



1



2



5



6



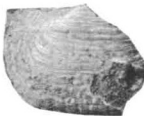
3



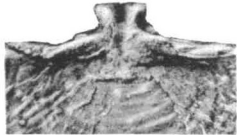
4



8



9



7



10



11



12



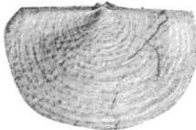
13



14



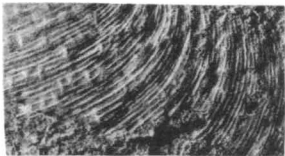
16



17



18



15



19



20



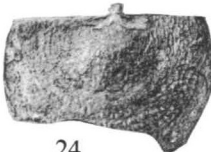
21



22



23



24



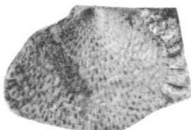
25



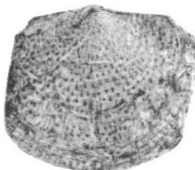
26



27



28



29



30

## PLATE 19

### *Spinocariniifera adunata* gen. et sp. nov.

(Figures 1-18 from locality 101/2, Burt Range Formation, 6 miles west of Mount Septimus.  
× 2 unless otherwise indicated).

#### Figures

- 1-3. Ventral, posterior, and lateral views of paratype CPC 8562.
- 4-7. Ventral, dorsal, posterior, and lateral views of paratype CPC 8563.
- 8-11. Ventral, dorsal, posterior, and lateral views of the holotype. CPC 8564.
12. Silicified pedicle valve exterior. CPC 8565.
- 13, 14. Posterior and dorsal views of part of a brachial valve showing the cardinal process. CPC 8566; × 4.
15. Silicified brachial valve exterior. Note the impressions of the external ornament on the trail. CPC 8567, paratype.
16. Part of a silicified brachial valve interior. CPC 8568.
- 17, 18. Internal and external faces of the cardinal process. CPC 8569; × 4.



1



4



8



2



5



9



3



6



10



12



7



13



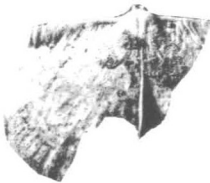
14



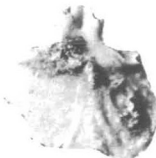
11



15



16



17



18

## PLATE 20

### *Spinauris cristata* gen. et sp. nov.

(Figures 1-8 are all  $\times 2$ .)

#### Figures

- 1-4. Posterior parts of four brachial valve interiors. CPC 8552, CPC 8553, CPC 8554, and CPC 8555, respectively; locality 103/7, Burt Range Formation, middle part of Enga Ridge.
- 5, 6. The same view of two specimens from locality 103/6, Burt Range Formation, middle part of Enga Ridge. CPC 8543, the holotype, and CPC 8556, a paratype.
7. Posterior part of a brachial valve interior. CPC 8557; locality 103/7.
8. External view of the cardinal process on CPC 8558, paratype; locality 103/6.

### *Spinocarinifera adunata* gen. et sp. nov.

(Figures 9-16 from locality 101/5, Burt Range Formation, 5.5 miles west of Mount Septimus. All  $\times 4$ .)

#### Figures

- 9-11. Internal, posterior, and external views of a silicified brachial valve. CPC 8559.
- 12, 13. Internal and posterior views of a silicified brachial valve. CPC 8560.
- 14-16. External, posterior, and internal views of a silicified brachial valve. CPC 8561.



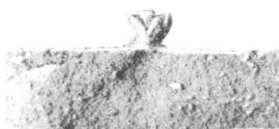
1



2



3



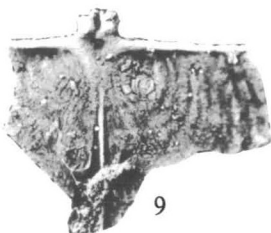
8



4



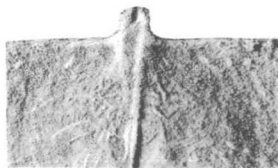
5



9



6



7



12



10



13



11



15



14



16



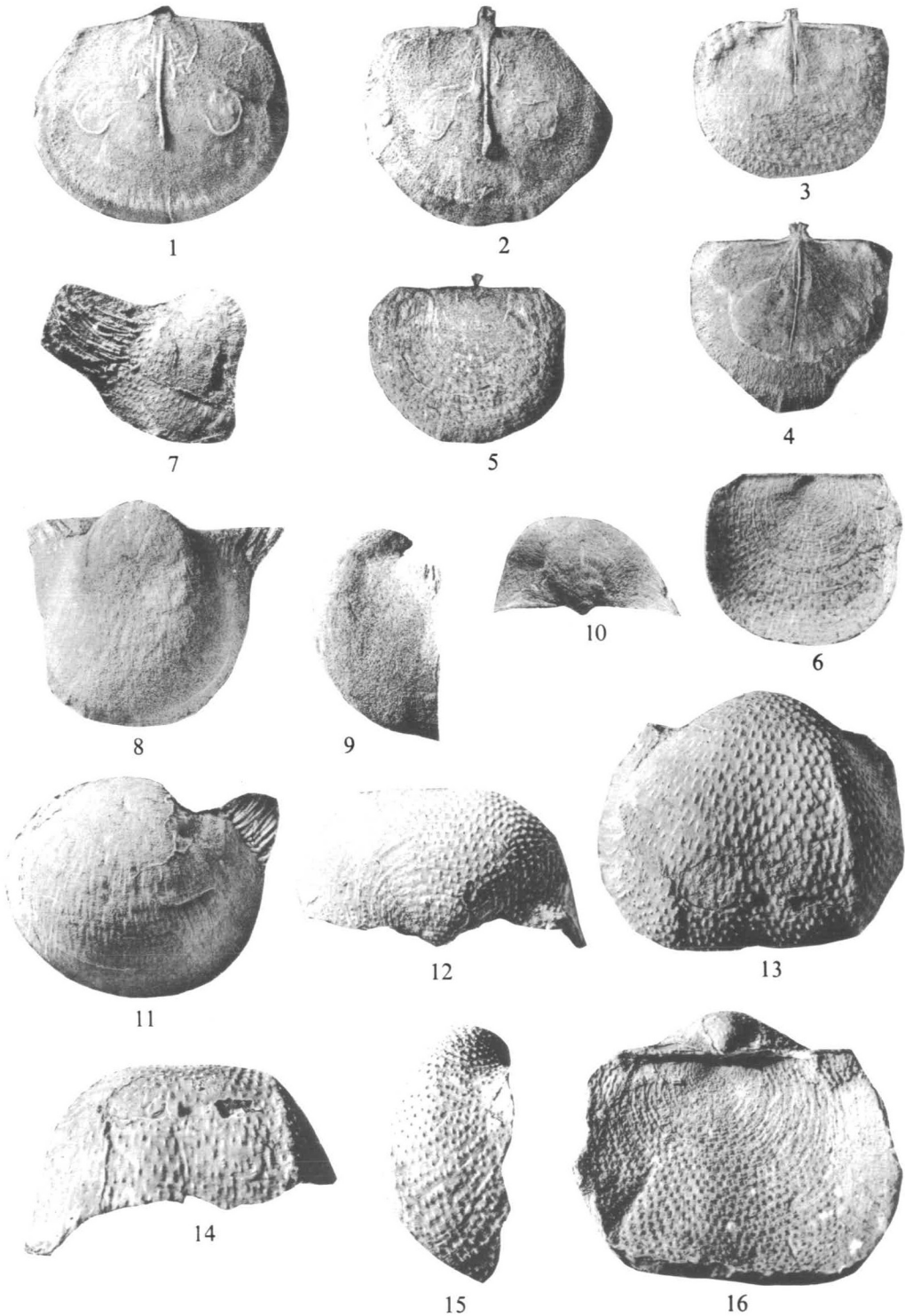
## PLATE 21

### *Spinauris cristata* gen. et sp. nov.

(Figures 1-16 are all  $\times 1$ .)

#### Figures

1. Rubber cast of a brachial valve interior showing the brachial markings and the muscle field. CPC 8542, paratype; locality 103/6, Burt Range Formation, middle part of Enga Ridge.
2. Rubber cast of the holotype, a brachial valve interior. CPC 8543; locality 103/6.
- 3, 4. Rubber casts of two brachial valve interiors. CPC 8544 and CPC 8545, respectively; locality 103/7, Burt Range Formation.
5. External mould of the brachial valve. CPC 8546; locality 103/7.
6. Rubber cast of the brachial valve exterior. CPC 8547; locality 101/18, Burt Range Formation, 4.5 miles west of Mount Septimus.
7. Rubber cast of part of a pedicle valve showing the spinose ears. CPC 8548; locality 103/6.
- 8-10. Ventral, lateral, and posterior views of an internal mould of a pedicle valve. CPC 8594, paratype; locality 103/6.
11. Rubber cast of part of a pedicle valve exterior. CPC 8550; locality 109/3, Burt Range Formation, middle part of Enga Ridge.
- 12-16. Posterior, ventral, anterior, lateral, and dorsal views of a large silicified specimen. CPC 8551; locality 104/11A, Septimus Limestone, Mount Septimus.



## PLATE 22

### *Spinauris sulcata* sp. nov.

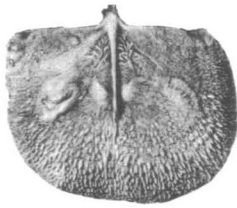
(Figures 1-23 from locality 104/17, Septimus Limestone, northwestern end of Mount Septimus.  $\times$  1 unless otherwise specified.)

#### Figures

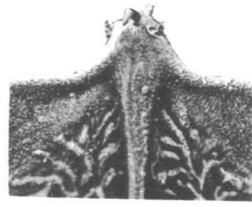
- 1-5. External and internal views of a silicified brachial valve. Figs 3, 4, and 5 are internal, external, and posterior views of the cardinal process, and are  $\times$  4. Note the dendritic adductor muscle scars. CPC 8535, paratype.
- 6, 7. Internal and external views of part of a brachial valve. CPC 8536.
8. Silicified brachial valve interior. CPC 8537.
- 9-12. Ventral, lateral, dorsal, and posterior views of the holotype. CPC 8538.
- 13-15. Ventral, posterior, and dorsal views of CPC 8539.
- 16-19. Interior, posterior, ventral, and lateral views of a silicified pedicle valve. Note the musculature. CPC 8540, paratype.
- 20-23. Anterior, posterior, lateral, and ventral views of a silicified pedicle valve. CPC 8541.



1



2



3



6



7



4



8



5



13



9



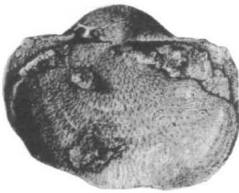
10



14



15



11



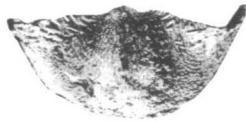
12



20



16



17



21



18



19



22



23

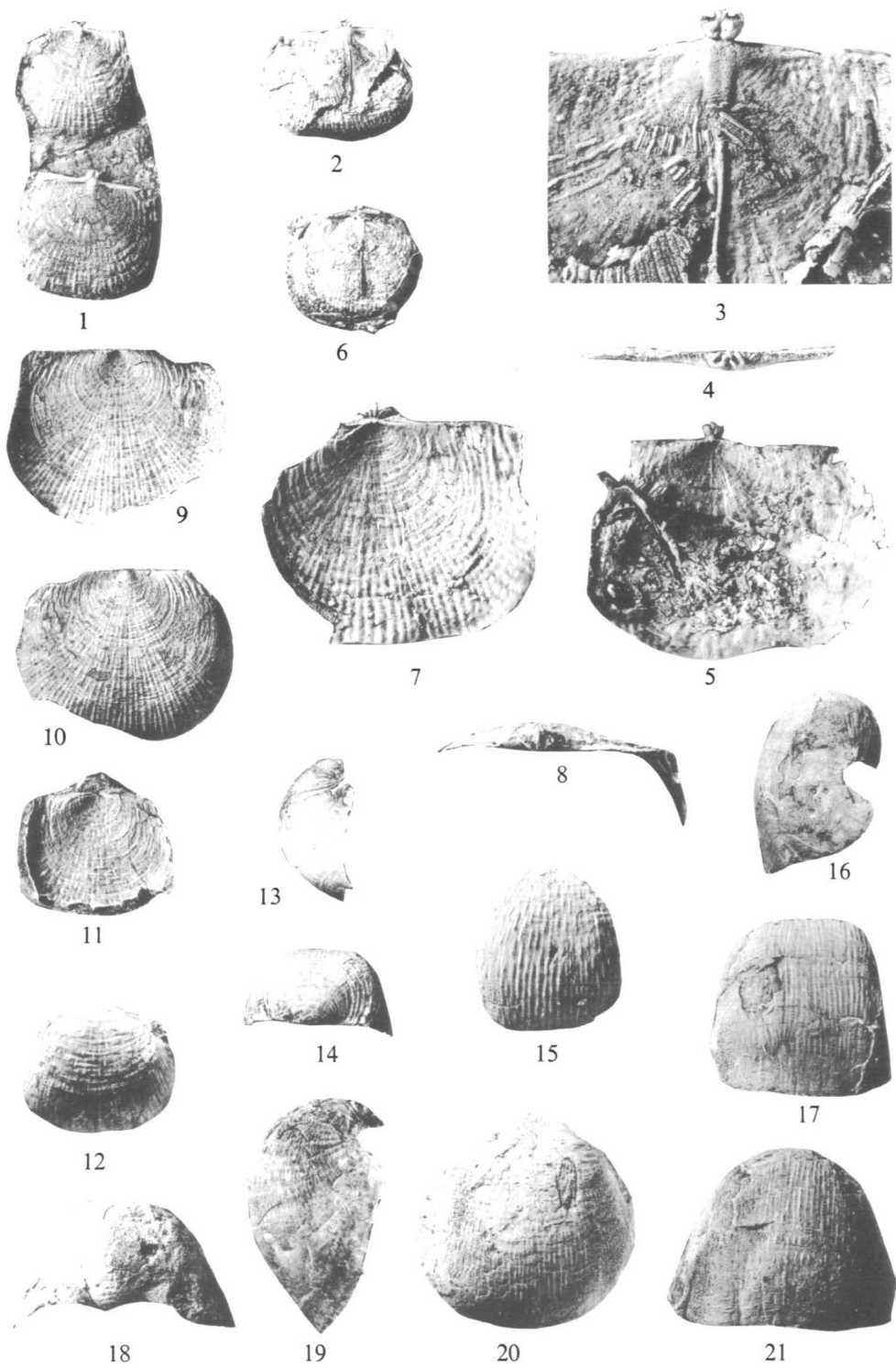
## PLATE 23

### *Acanthocosta teichertii* gen. et sp. nov.

(Figures 1-21 from the Burt Range Formation, 7 miles northwest of Mount Septimus.  $\times 1$  unless otherwise indicated.)

#### Figures

1. Two partly decorticated brachial valve interiors. CPC 8527; locality 100/19B.
- 2-5. Internal and external views of a silicified brachial valve. Figs 3 and 4 show detail of the median septum and cardinal process. CPC 8528, paratype; locality 100/19B. Figs 3 and 4,  $\times 4$ ; Fig. 5  $\times 2$ .
- 6-8. Internal, external, and posterior views of a silicified brachial valve. Note the reduced lateral lobes on the cardinal process. CPC 8529, paratype; locality 100/19B.
- 9-10. Rubber cast and a mould of a brachial valve exterior. CPC 8530; locality 100/24.
- 11-14. Dorsal, ventral, lateral, and posterior views of CPC 8531. Locality 100/18.
15. External ornament on a pedicle valve. CPC 8532; locality 100/20.
- 16-17. Lateral and anteroventral views of CPC 8533. Locality 100/22.
- 18-21. Posterior, lateral, ventral, and anteroventral views of CPC 8534. Locality 100/24.



## PLATE 24

### *Acanthocosta teichertii* gen. et sp. nov.

(Figures 1-15 from locality 100/19B, Burt Range Formation, 7 miles northwest of Mount Septimus.  $\times 4$  unless otherwise indicated.)

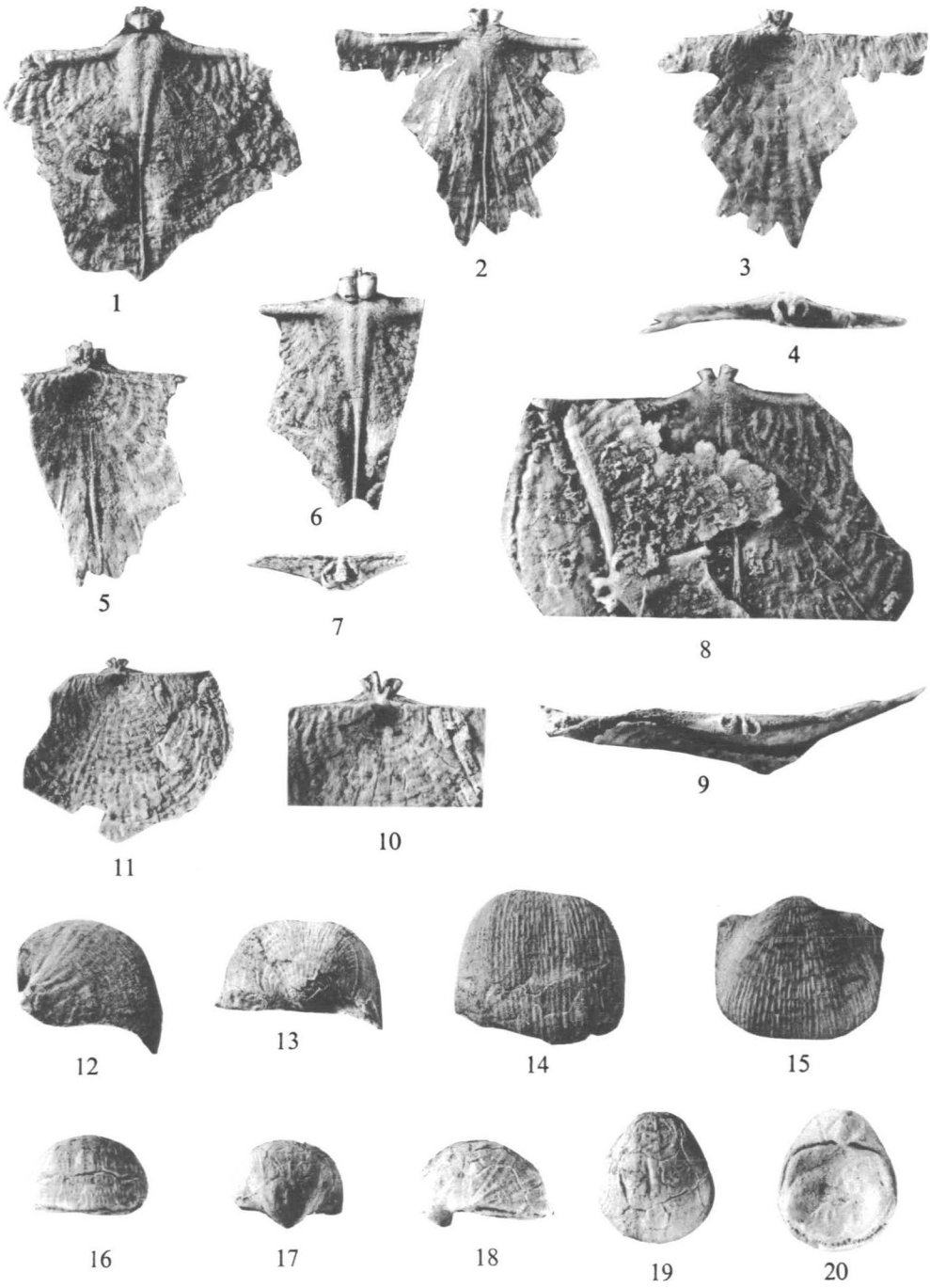
#### Figures

1. Silicified brachial valve interior. CPC 8523.
- 2-4. Internal, external, and posterior views of part of a silicified brachial valve. CPC 8524, paratype.
- 5-7. External, internal, and posterior views of part of a silicified brachial valve. Note the trilobed cardinal process. CPC 8525.
- 8-11. Internal, posterior, and external views of a silicified brachial valve having a bilobed cardinal process. CPC 8526, paratype; Fig. 11  $\times 2$ .
- 12-15. Lateral, posterior, anteroventral, and ventral views of the holotype. CPC 8645;  $\times 1$ .

### *Echinoconchus gradatus* Campbell

#### Figures

- 16-20. Anterior, posterior, lateral, ventral, and dorsal views of CPC 10926. Locality 306, Burvill Beds, Burvill Point;  $\times 1$ .





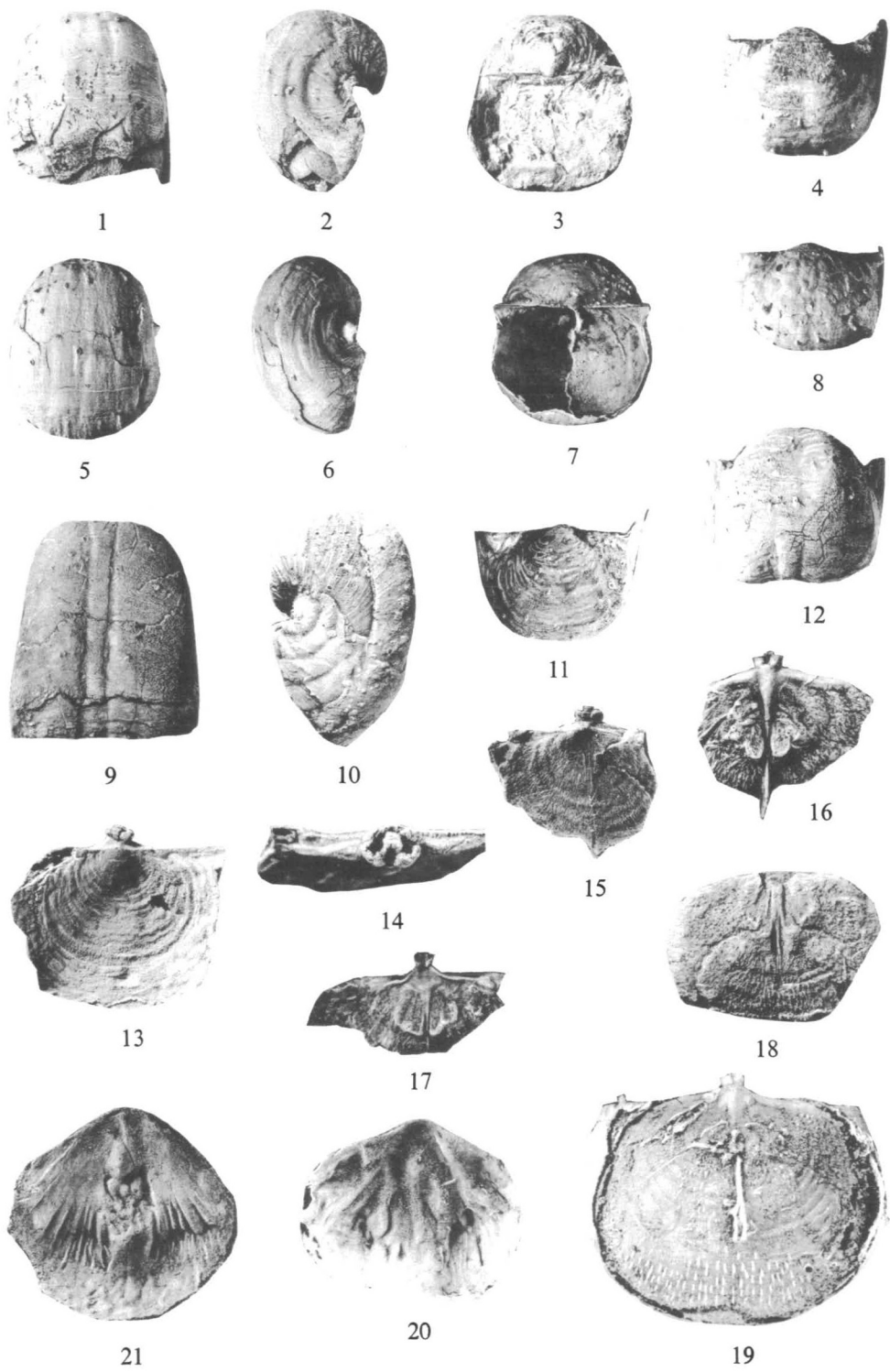
## PLATE 25

### *Magnumbonella prolata* sp. nov.

(Figures 1-21 from locality 102/4, Enga Sandstone, northern end of Enga Ridge.  $\times 1$  unless otherwise indicated.)

#### Figures

- 1-4. Anteroventral, lateral, dorsal, and posterior views of paratype CPC 8499.
- 5-8. Anteroventral, lateral, dorsal, and posterior views of the holotype. CPC 8500.
- 9-12. Anteroventral, lateral, posterior, and ventral views of a large specimen. Note the median sinus and coarse ribs on the lateral extremities of the trail. CPC 8501, paratype.
13. Brachial valve exterior. CPC 8502, paratype.
- 14-16. Part of a brachial valve viewed posteriorly, externally, and internally. Note the two pairs of adductor muscle scars in Fig. 16. CPC 8503, paratype; Fig. 14  $\times 4$ , Figs 15 and 16  $\times 2$ .
17. Part of a brachial valve interior with lateral ridges which appear too weak to reach the lateral margin. CPC 8504;  $\times 2$ .
18. Part of a brachial valve interior showing the brachial ridges. CPC 8505.
19. Silicified brachial valve interior with well-developed lateral ridges. CPC 8506, paratype;  $\times 2$ .
- 20, 21. Two pedicle valve interiors showing the muscle field. CPC 8507 and CPC 8508, respectively; both paratypes;  $\times 2$ .



## PLATE 26

### *Protoniella? waggonensis* sp. nov.

(Figures 1-24 from locality 210/6, unnamed Tournaisian breccia, Waggon Creek valley.  
× 1 unless otherwise indicated.)

#### Figures

- 1-3. Ventral, lateral, and posterior views of CPC 8586, paratype.
- 4, 5. Anteroventral and lateral views of CPC 8587.
- 6-8. Ventral, anteroventral, and lateral views of the holotype. CPC 8588.
- 9-11. Ventral, anteroventral, and lateral views of paratype CPC 8589.
- 12. Part of a pedicle valve interior. CPC 8590.
- 13-15. External, internal, and posterior views of a brachial valve. CPC 8591, paratype;  
× 2.
- 16. Part of a brachial valve exterior. CPC 8592.
- 17, 18. Internal and posterior views of a brachial valve. CPC 8593; × 2.
- 19-21. Posterior, external, and internal views of a brachial valve. CPC 8594, paratype;  
× 2.
- 22-24. External and internal views of paratype CPC 8595. Fig. 24 × 2.

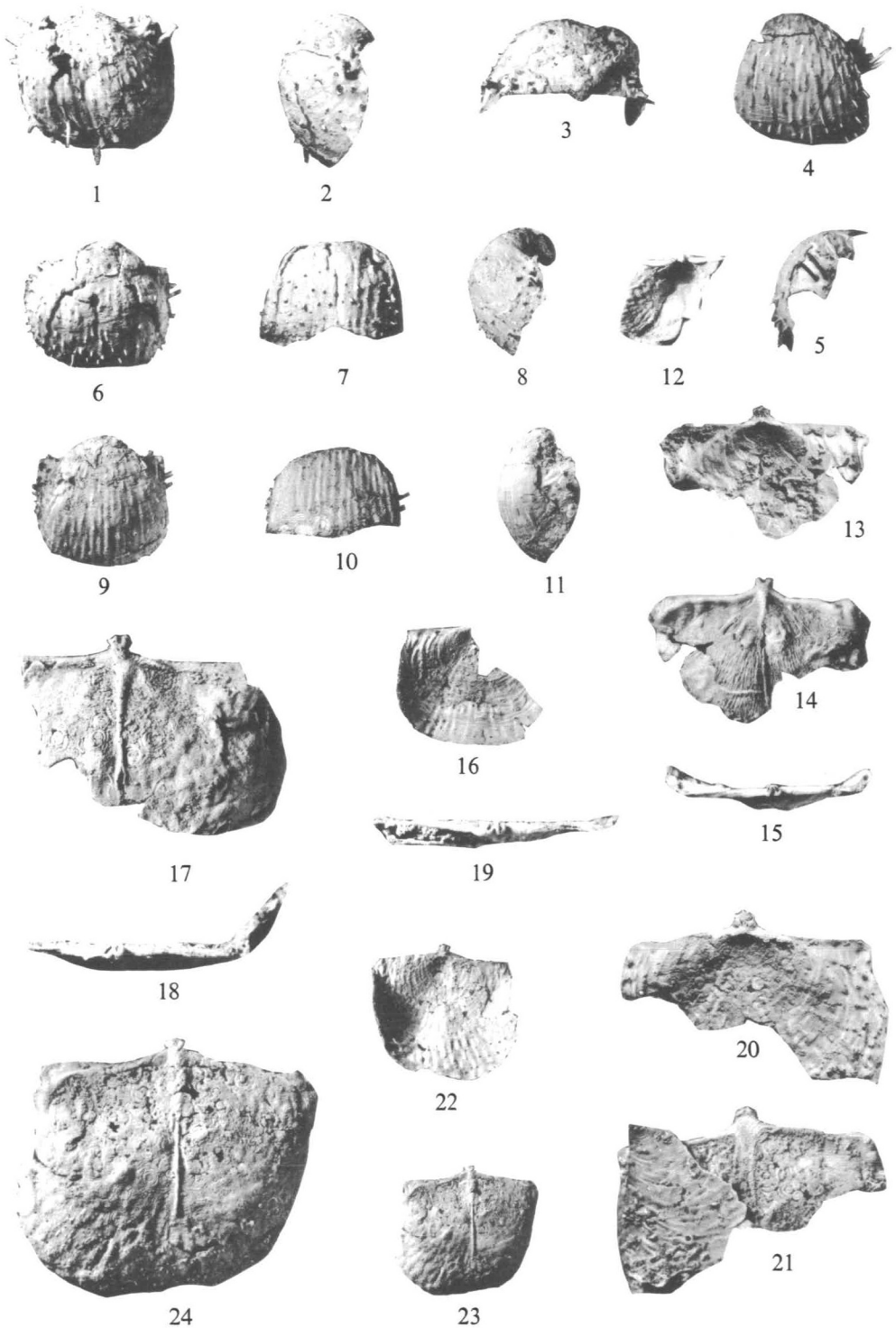


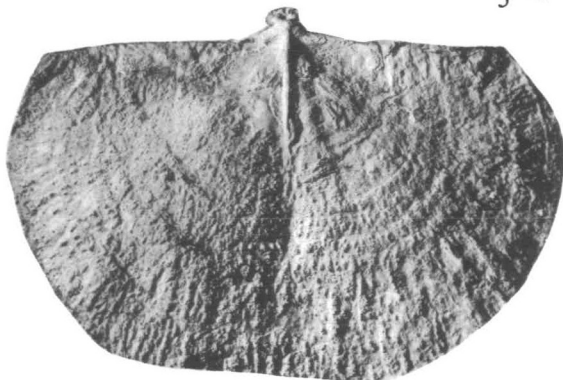
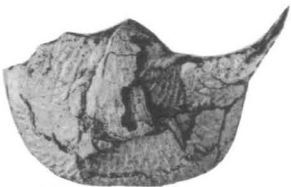
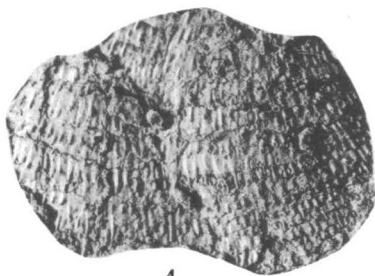
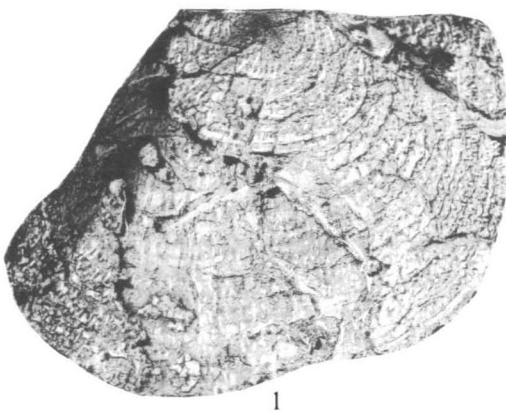
PLATE 27

*Stegacanthia strigis* sp. nov.

(Figures 1-9 are all  $\times 1$ .)

Figures

1. Rubber cast of a brachial valve exterior. CPC 8481; locality 306, Burvill Beds, Burvill Point.
- 2, 3. Exterior and interior of a silicified pedicle valve. CPC 8482, holotype; locality 108/4A, Utting Calcarenite, Utting Gap.
4. Rubber cast of part of a pedicle valve exterior. CPC 8483; locality 306.
- 5-7. Lateral, posterior, and anteroventral views of CPC 8484. Locality 107/1, Utting Calcarenite, Utting Gap.
8. Rubber cast of a brachial valve interior. CPC 8485; locality 306.
9. Interior of a large brachial valve. CPC 8486; locality 305/1, Burvill Beds, 1.5 miles northeast of Ningbing Homestead.



## PLATE 28

### *Marginatia mimica* sp. nov.

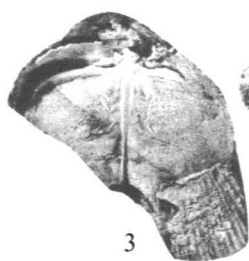
(Figures 1-20 from locality 104/17, Septimus Limestone, northwestern end of Mount Septimus, unless otherwise indicated.  $\times 1$  unless otherwise indicated.)

#### Figures

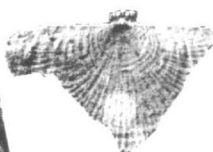
- 1, 2. Dorsal and anterior views of the holotype. Note the lateral ridges extending into the marginal rim. CPC 8596.
3. Silicified brachial valve interior. CPC 8597, paratype.
- 4-6. External, posterior, and internal views of part of a silicified brachial valve. CPC 8598, paratype; Figs 4 and 6  $\times 2$ , Fig. 5  $\times 4$ .
7. Partly decorticated brachial valve interior. CPC 8599;  $\times 2$ .
8. Dorsal view of CPC 8600. Locality 112/2, Septimus Limestone, Langfield Point.
9. Dorsal view of CPC 8601.  $\times 2$ .
10. Dorsal view of CPC 8602.
- 11, 12. Anteroventral and posterior views of a pedicle valve. CPC 8603, paratype.
13. Large halteroid spines on the trail of a pedicle valve. CPC 8604, paratype.
- 14, 15. Exterior and interior of a pedicle valve. Note the musculature. CPC 8605, paratype.
16. Pedicle valve exterior. CPC 8606.
- 17-19. Anteroventral, ventral, and lateral views of CPC 8607. Locality 112/2.
20. Dorsal view of CPC 8608, showing the spines along the hinge of the pedicle valve.



1



3



4



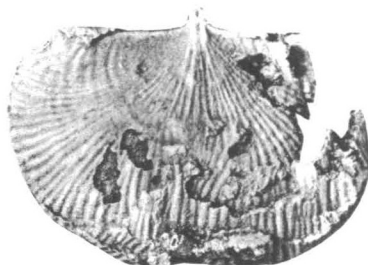
5



6



2



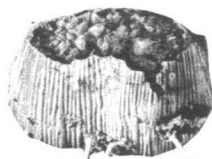
7



8



11



13



9



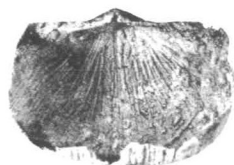
12



10



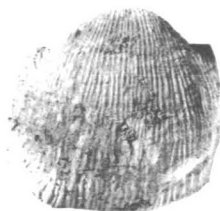
14



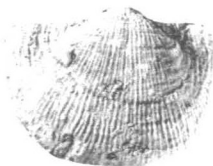
15



16



17



18



19



20



## PLATE 29

### *Echinoconchus gradatus* Campbell

(Figures 1-14 from locality 458/12, Point Spring Sandstone, Weaber Range.  $\times$  1 unless otherwise specified.)

#### Figures

1. Internal mould of a pedicle valve. CPC 10927.
- 2-5. Ventral, anterior, posterior, and lateral views of CPC 10928.
6. Internal mould of a pedicle valve. CPC 10929.
- 7, 8. Rubber cast and mould of a brachial valve exterior. CPC 10930.
9. External mould of a brachial valve. CPC 10931.
10. Rubber cast of part of a brachial valve interior. CPC 10932;  $\times$  2.
11. Rubber cast of a brachial valve interior. CPC 10933;  $\times$  2.
- 12-14. Lateral, anterior and ventral views of an internal mould of a pedicle valve. CPC 10934.

### *Ovatia* sp. B

(Figures 16-20 from locality 458/12, Point Spring Sandstone, Weaber Range.  $\times$  1.)

#### Figures

15. Internal mould of a brachial valve. CPC 10935; locality 301, Burvill Beds, Milligans Hills;  $\times$  2.
16. External mould of a brachial valve. CPC 10936.
- 17, 18. Moulds of two pedicle valve interiors. CPC 10937 and CPC 10938, respectively.
- 19, 20. Ventral and lateral views of an internal mould of a pedicle valve. CPC 10939.

### *Ovatia* sp. A

(Figures 21-28 from locality 7/1, Ningbing Limestone (Tournaisian part), Ningbing Range.  $\times$  1.)

#### Figures

- 21, 22. Mould and rubber cast of a brachial valve exterior. CPC 10940.
- 23, 24. Mould and rubber cast of two brachial valve exteriors. CPC 10941.
- 25-28. Ventral, anteroventral, lateral, and posterior views of pedicle valve. CPC 10942.

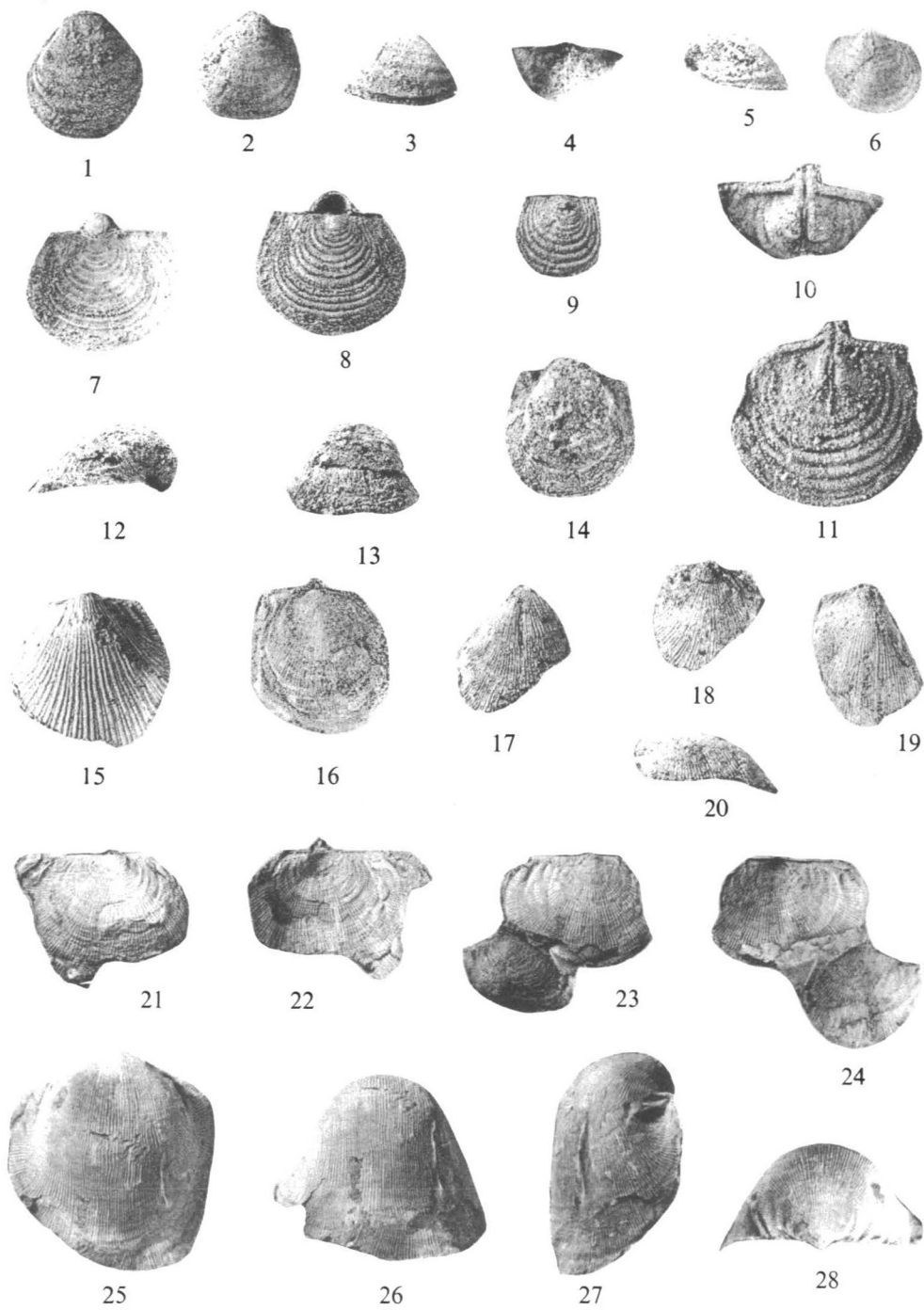


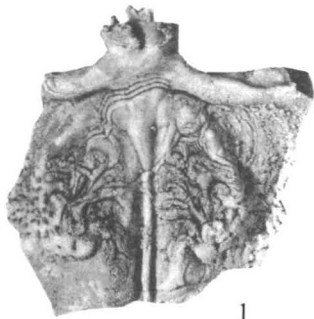
PLATE 30

*Dictyoclostus? juniferus* sp. nov.

(Figures 4-16 are all  $\times 1$ .)

Figures

- 1-3. Internal, external, and posterior views of part of a silicified brachial valve. CPC 8636, paratype; locality 107/6A, Utting Calcarenite, Utting Gap.
4. Brachial valve interior. CPC 8637; locality 305/1, 1.5 miles northeast of Ningbing Homestead.
5. Brachial valve interior. CPC 8638, paratype; locality 107/1, Utting Calcarenite, Utting Gap.
6. Interior of a ferruginized brachial valve showing the brachial ridges. CPC 8639; locality 306, Burvill Beds, Burvill Point.
7. Internal mould of a pedicle valve. Note the marginal ridge. CPC 8640; locality 306.
- 8, 9. Ventral and dorsal views of paratype. CPC 8641; locality 107/6A.
10. Anteroventral view of a slightly deformed pedicle valve showing the elongate trail. CPC 8642; locality 107/1.
- 11-13. Ventral, lateral, and posterior views of paratype. CPC 8643; locality 107/1.
- 14-16. Anteroventral, lateral, and posterior views of the holotype. CPC 8644; locality 107/1.



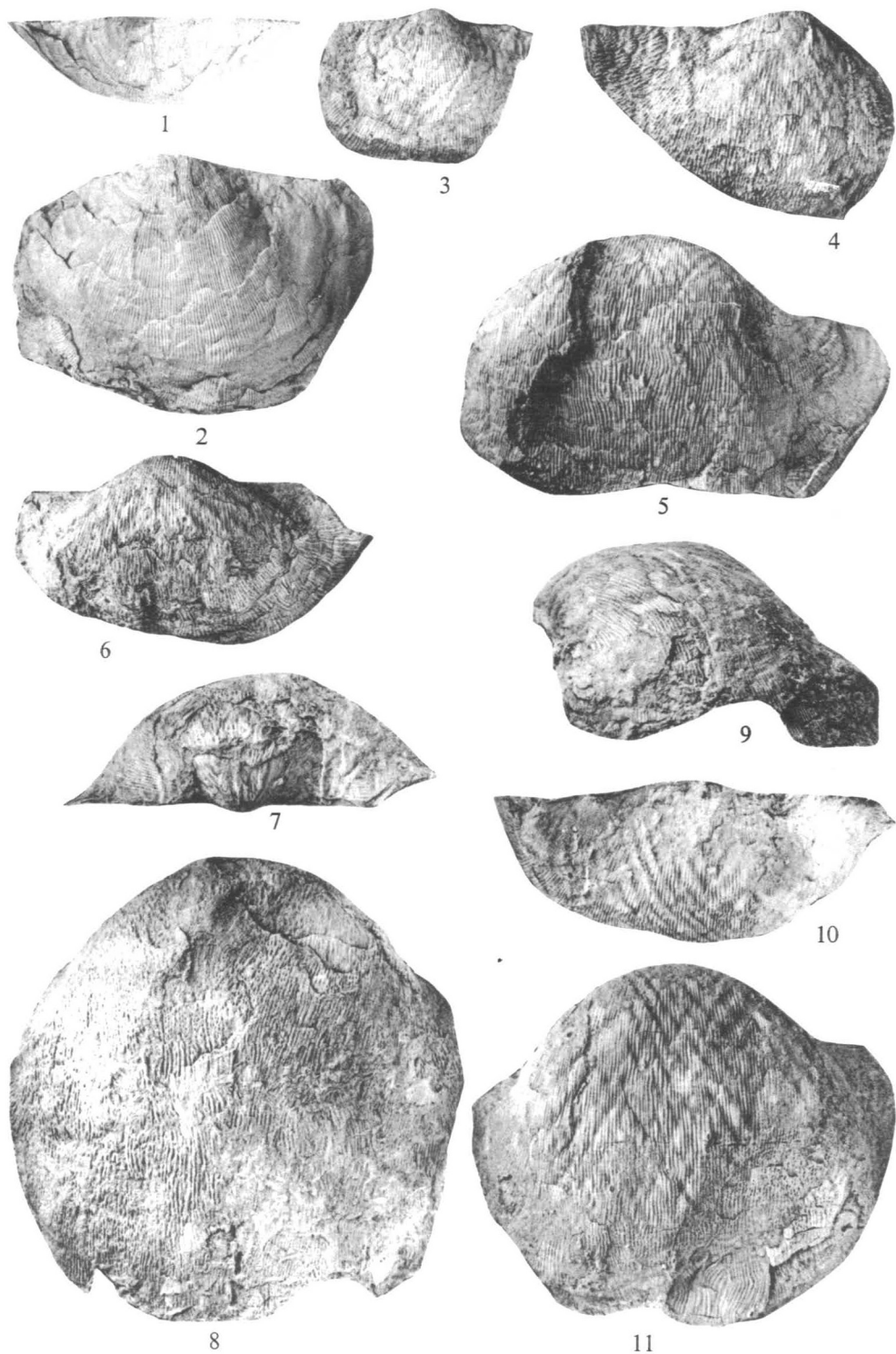
## PLATE 31

### Gigantoproductinid gen. et sp. indet.

(Figures 1 and 2 from locality 108/7, Burvill Beds, Utting Gap; Figures 3-11 from locality 435/0, Burvill Beds, 5 miles northeast of Point Spring at the foot of the Weaber Range. All specimens  $\times 1$ .)

#### Figures

- 1, 2. Posterior and ventral views of CPC 10943.
- 3. Exterior of a small pedicle valve. CPC 10944.
- 4. Broken brachial valve interior. CPC 10945.
- 5. Pedicle valve exterior. CPC 10946.
- 6. Pedicle valve exterior. CPC 10947.
- 7, 8. Posterior and ventral views of CPC 10948.
- 9-11. Lateral, posterior, and ventral views of CPC 10949.



## PLATE 32

### *Septemirostellum septimum* (Veevers)

(Figures 1-20 from the Septimus Limestone. Figures 1-15 are views of the three silicified topotypes from locality 104/11, Mount Septimus. All  $\times 2$ .)

#### Figures

- 1-5. Ventral, dorsal, posterior, lateral, and anterior views of silicified topotype. CPC 8487.
- 6-10. Ventral, dorsal, posterior, lateral, and anterior views of silicified topotype. CPC 8488.
- 11-15. Ventral, dorsal, posterior, lateral, and anterior views of silicified topotype. CPC 8489.
16. A small silicified brachial valve interior. The inner hinge plate is missing. CPC 8490, topotype; locality 104/11, Mount Septimus;  $\times 4$ .
17. Silicified brachial valve interior. CPC 8491, topotype; locality 104/11, Septimus Limestone;  $\times 4$ .
18. Brachial valve interior showing the delicate inner hinge plate in position. CPC 8492; locality 138/1, 1 mile southeast of Langfield Point, near the entrance of the Burt Range Amphitheatre;  $\times 4$ .
19. Apical interior of a silicified specimen showing the dorsal median septum, the septalium, the crural bases, and the dental plates. CPC 8493; same locality as Fig. 18;  $\times 4$ .
20. Silicified pedicle valve interior. CPC 8494, topotype; locality 104/11, Mount Septimus;  $\times 2$ .

### *Nayunnella turgida* sp. nov.

(Figures 21-36 from locality 8/1 (fore-reef) of the Ningbing Limestone, Surprise Creek, Ningbing Range. All  $\times 1$ .)

#### Figures

- 21-25. Ventral, dorsal, anterior, lateral, and posterior views of paratype CPC 8495.
- 26-30. Ventral, dorsal, anterior, lateral, and posterior views of paratype CPC 8496.
31. Broken brachial valve exterior showing the abrupt change from costellate to costate ornament at the front of a mature specimen. CPC 8497.
- 32-36. Ventral, dorsal, anterior, lateral, and posterior views of the holotype. CPC 8498.



1



2



3



4



5



6



7



8



9



10



11



12



13



14



15



16



17



18



20



21



22



23



19



25



24



31



26



27



28



29



30



32



33



34



35



36



## PLATE 33

### *Septemirostellum? tereticostum* sp. nov.

(Figures 1-20 from locality 100/14, Burt Range Formation, 7 miles northwest of Mount Septimus. All  $\times 2$ .)

#### Figures

- 1-5. Ventral, dorsal, posterior, anterior, and lateral views of CPC 8310, the holotype.
- 6-10. Ventral, dorsal, posterior, anterior, and lateral views of CPC 8311, a paratype.
- 11-15. Ventral, dorsal, posterior, anterior and lateral views of CPC 8312, a paratype.
- 16-20. Ventral, dorsal, posterior, anterior, and lateral views of CPC 8313, a paratype.

### *Septemirostellum simplex* sp. nov.

Figures 21-35 are silicified specimens from locality 128/6, Burt Range Formation, middle part of Enga Ridge. All  $\times 4$ .)

#### Figures

- 21, 22. Ventral and dorsal views of a juvenile specimen. CPC 10950, paratype.
- 23-26. Ventral, dorsal, posterior, and anterior views of a paratype. CPC 10951.
- 27-31. Ventral, dorsal, anterior, posterior, and lateral views of the holotype. Note the lateral curvature of the costae adjacent to the front of the fold and sinus. CPC 10952.
- 32. Ventral valve of a large adult specimen. CPC 10953, paratype.
- 33. Brachial valve interior. CPC 10954, paratype.
- 34. Brachial valve interior. In both Figs 33 and 34 the inner hinge plate is missing. CPC 10955, paratype.
- 35. Pedicle valve interior showing the dental plates. CPC 10956, paratype.



1



2



3



4



5



6



7



8



9



10



11



12



13



14



15



16



17



18



19



20



21



22



23



24



25



26



27



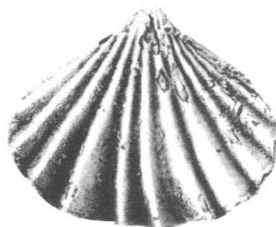
28



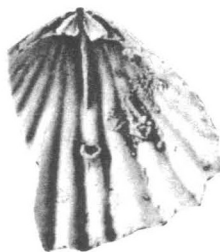
29



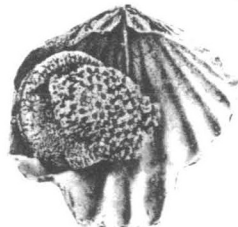
30



32



33



34



31



35

## PLATE 34

### *Septemirostellum amnicum* (Veevers)

(Figures 1-20 from locality 102/4, Enga Sandstone, northern end of Enga Ridge. Figures 1-15 are all  $\times 1$ .)

#### Figures

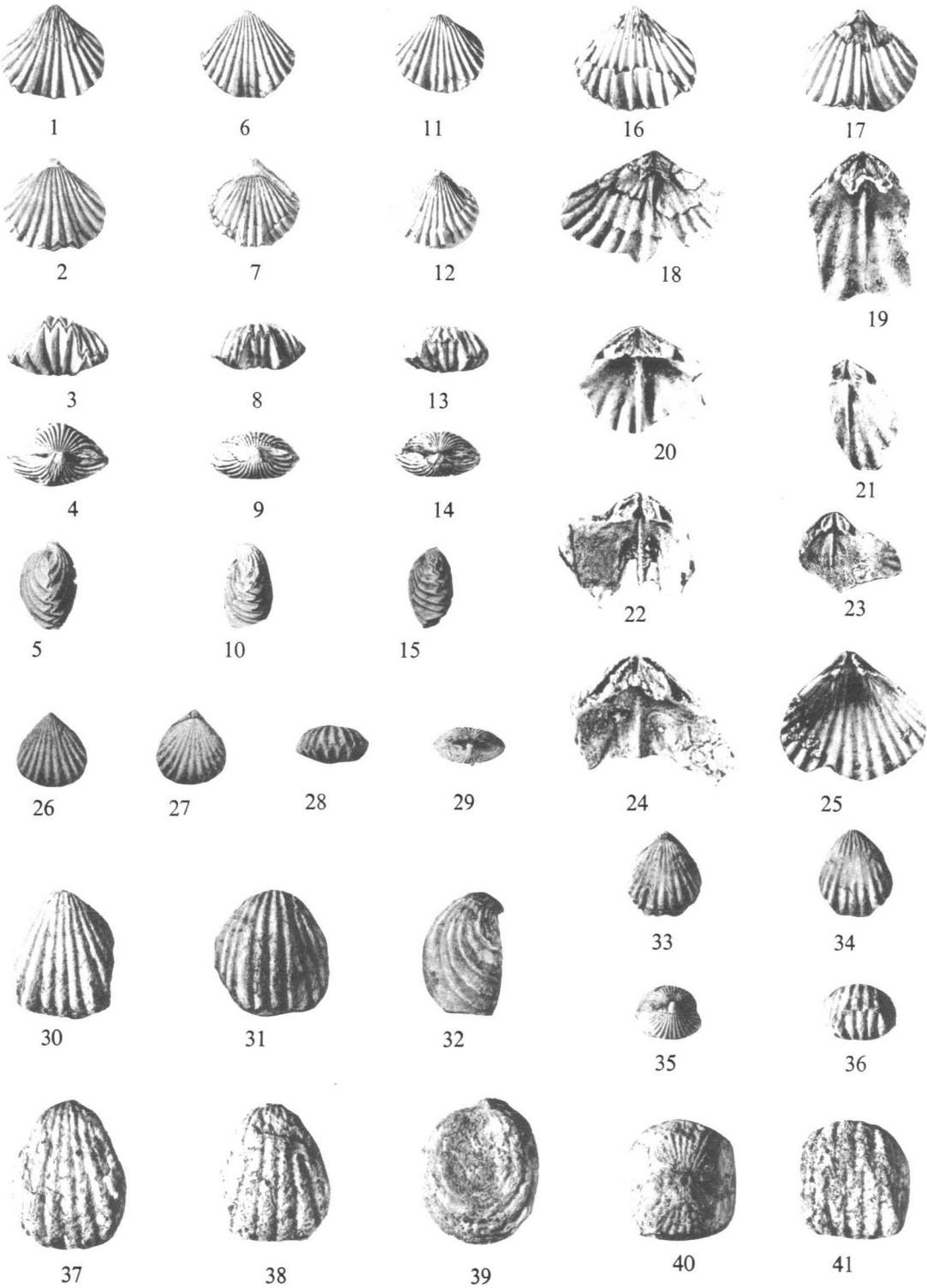
- 1-5. Ventral, dorsal, anterior, posterior, and lateral views of CPC 8269.
- 6-10. Ventral, dorsal, anterior, posterior, and lateral views of CPC 8270.
- 11-15. Ventral, dorsal, anterior, posterior, and lateral views of CPC 8271.
- 16, 17. Ventral and dorsal views of a large partially crushed specimen. CPC 8272;  $\times 1$ .
- 18. Silicified brachial valve interior. CPC 8273;  $\times 2$ .
- 19. Silicified brachial valve interior showing the inner hinge plate, the apical foramen, the outer hinge plates, and the median septum. CPC 8274;  $\times 4$ .
- 20. Silicified brachial valve interior. CPC 8275;  $\times 4$ .

### *Grammorhynchus eganensis* (Veevers)

(Figures 21-25 from locality 109/5, Burt Range Formation, middle part of Enga Ridge. Figures 26-41 from locality 103/12, Burt Range Formation, middle part of Enga Ridge).

#### Figures

- 21-24. Four silicified apical interiors of the brachial valve. Fig. 24 shows the inner hinge plate, and is  $\times 4$ ; Figs 21-23 are  $\times 2$ . CPC 8276, CPC 8277, CPC 8278, and CPC 8279 respectively.
- 25. Silicified pedicle valve interior. CPC 8280;  $\times 2$ .
- 26-29. Ventral, dorsal, anterior, and posterior views of a small specimen. Note the gently biconvex shell, and nearly straight anterior commissure. CPC 8281;  $\times 1$ .
- 30. A large elongate pedicle valve exterior. CPC 8282;  $\times 1$ .
- 31, 32. Dorsal and lateral views of a large brachial valve. CPC 8283;  $\times 1$ .
- 33-36. Dorsal, ventral, posterior, and anterior views of CPC 8284;  $\times 1$ .
- 37-41. Ventral, dorsal, lateral, posterior, and anterior views of a very large specimen. CPC 8285;  $\times 1$ .



## PLATE 35

### *Rugaltarostrum australe* sp. nov.

(Figures 1-21 from locality 455/2, Ningbing Limestone (reef), Ningbing Range.  $\times$  1 unless otherwise specified.)

#### Figures

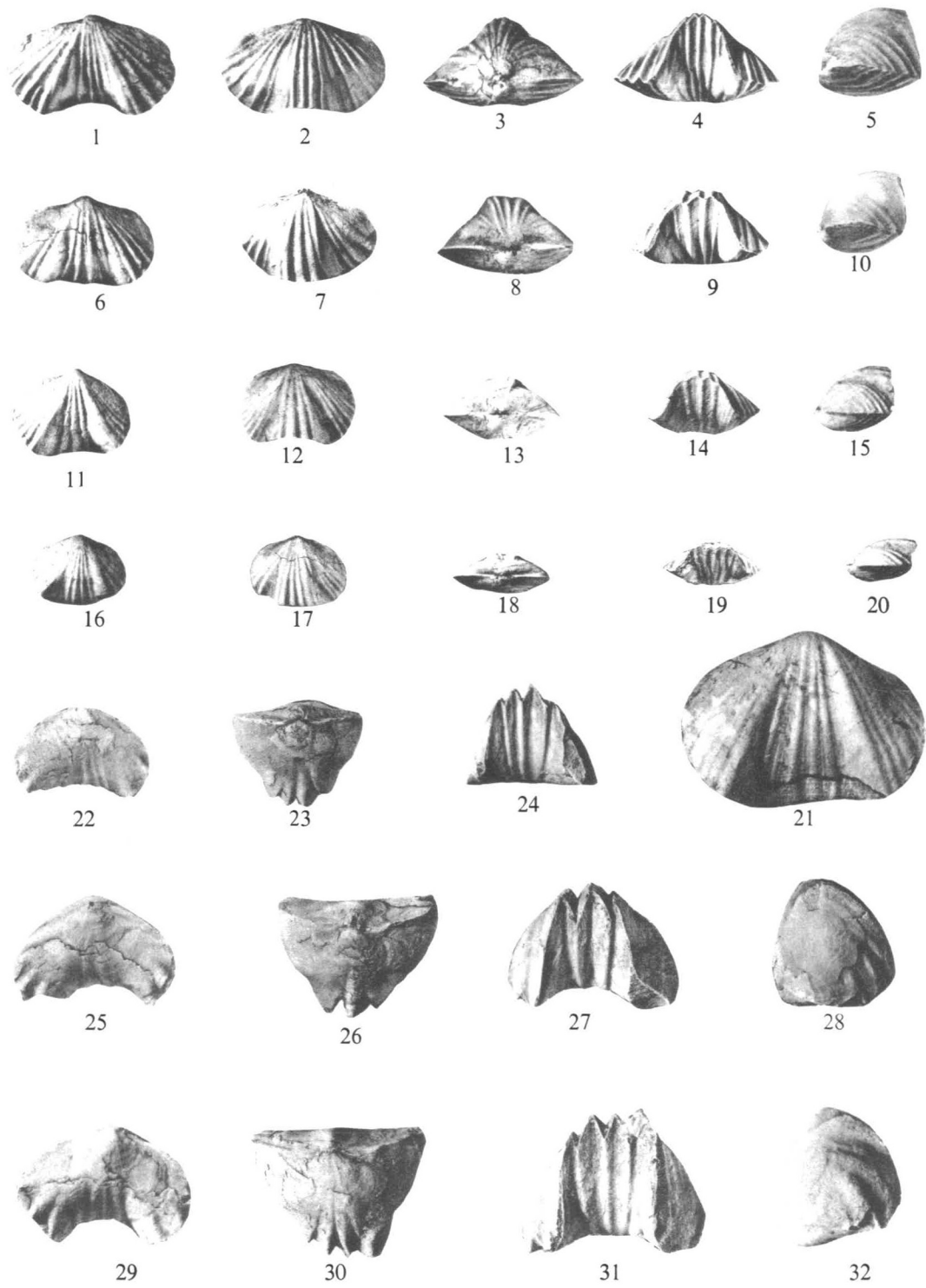
- 1-5. Ventral, dorsal, posterior, anterior, and lateral views of the holotype. Note the bifurcating and intercalating costae on the flanks, and the accessory costae on the fold and sinus. CPC 8302.
- 6-10. Ventral, dorsal, posterior, anterior, and lateral views of CPC 8303, a paratype.
- 11-15. Ventral, dorsal, posterior, anterior, and lateral views of CPC 8304, a paratype. Note the capillate ornament in the sinus.
- 16-20. Ventral, dorsal, posterior, anterior, and lateral views of a small individual. CPC 8305, paratype.
- 21. Pedicle valve exterior showing the capillate micro-ornament in the sinus. CPC 8306;  $\times$  2.

### *Ningbingella flexuosa* gen. et sp. nov.

(Figures 22-32 from locality 7/1 (Tournaisian), Ningbing Limestone, Ningbing Range. All  $\times$  1.)

#### Figures

- 22-24. Ventral, posterior, and anterior views of paratype. CPC 8307.
- 25-28. Ventral, posterior, anterior, and lateral views of paratype. CPC 8308.
- 29-32. Ventral, posterior, anterior, and lateral views of the holotype. CPC 8309.



## PLATE 36

### *Ptychomaletoechia lucida* (Veevers)

(Figures 1-12 from locality 140/3, Ningbing Limestone (back-reef), southern end of Ningbing Range.)

#### Figures

- 1-5. Dorsal, ventral, anterior, posterior, and lateral views of a complete specimen. CPC 8646;  $\times 2$ .
- 6-10. Ventral, dorsal, anterior, posterior, and lateral views of CPC 8647.  $\times 2$ .
- 11, 12. Dorsal and posterior views of a large brachial valve. Note the ventral deflection of the fold. CPC 8648;  $\times 1$ .

### *Pugnoides erugatus* sp. nov.

(Figures 13-36 from the locality 101/2, Burt Range Formation, 6 miles west of Mount Septimus.)

#### Figures

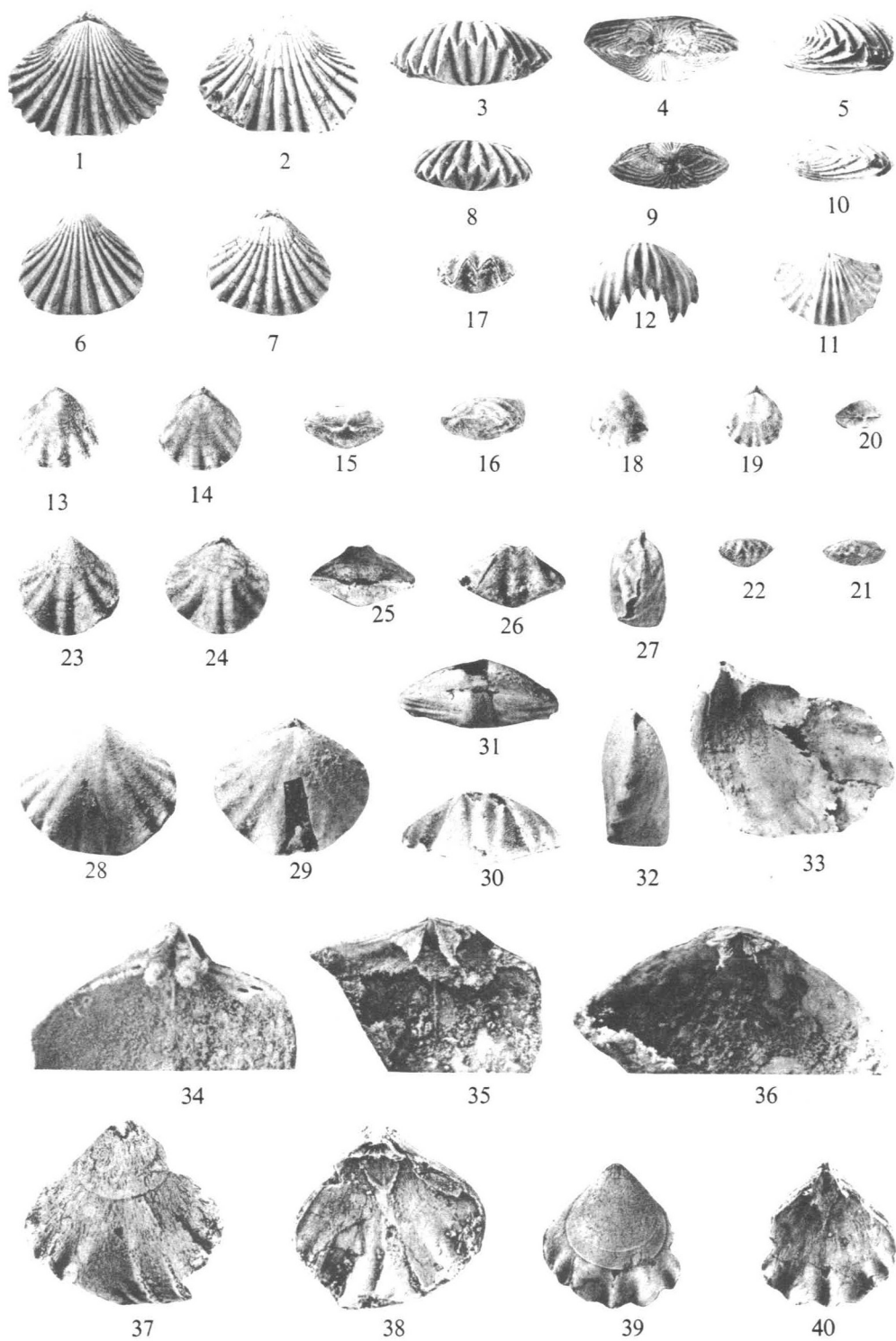
- 13-17. Ventral, dorsal, posterior, lateral, and anterior views of paratype CPC 8316.  $\times 2$ .
- 18-22. Ventral, dorsal, posterior, lateral and anterior views of paratype CPC 8660.  $\times 2$ .
- 23-27. Ventral, dorsal, posterior, anterior, and lateral views of the holotype. CPC 8314;  $\times 2$ .
- 28-32. Ventral, dorsal, anterior, posterior, and lateral views of a large paratype. CPC 8315;  $\times 2$ .
- 33. Broken silicified pedicle valve interior showing the dental plates. CPC 8317, paratype;  $\times 6$ .
- 34-36. Dorsal interiors of three silicified paratypes showing the hinge plates, and the septalium. CPC 8320, CPC 8318, and CPC 8319, respectively; all  $\times 4$ .

### *Coledium?* sp.

(Figures 37-40 from locality 108/0, Utting Calcarene at Utting Gap. All  $\times 4$ .)

#### Figures

- 37, 38. Exterior and interior of a pedicle valve. The interior shows the spondylium with a median ridge at the front, and has the apex of the brachial valve attached at the hinge. CPC 8649.
- 39, 40. Exterior and interior of a pedicle valve. CPC 8650.





## PLATE 37

### *Septemirostellum?* sp.

(Figures 1-8 from locality 108/0, Utting Calcarene, Utting Gap.  $\times 2$  unless otherwise indicated.)

#### Figures

1. Silicified pedicle valve exterior. CPC 10957.
2. Silicified pedicle valve exterior. CPC 10958.
3. Silicified pedicle valve interior. CPC 10959;  $\times 4$ .
- 4, 5. Ventral and dorsal views of a compressed specimen. CPC 10960.
6. A silicified dorsal valve showing the external ornament. CPC 10961.
- 7, 8. Internal and external views of a silicified brachial valve. Fig. 7 shows the hinge plates, median septum, muscle field, and mantle canals. CPC 10962. Fig. 7  $\times 4$ .

### *Pleuropugnoides* sp.

#### Figures

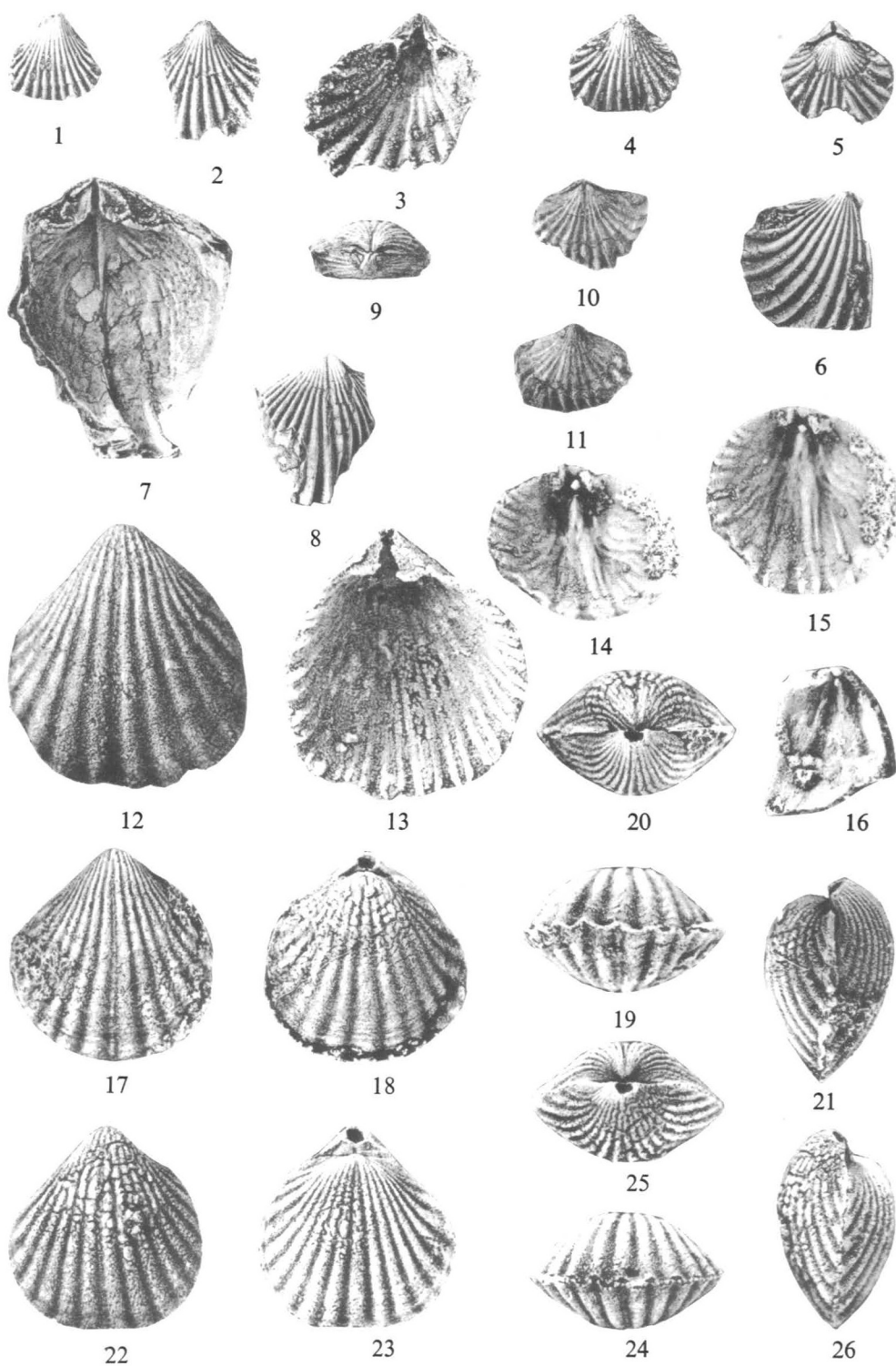
- 9-11. Posterior, dorsal, and ventral views of a ferruginized internal mould from locality 306, Burvill Beds, Point Burvill. CPC 10963.

### *Hustedia paula* sp. nov.

(Figures 12-26 from locality 108/0, Utting Calcarene, Utting Gap. All  $\times 6$ .)

#### Figures

- 12, 13. Exterior and interior of a pedicle valve. The symphytium is broken. CPC 10964, paratype.
- 14, 15. Anterior and ventral views of a brachial valve interior showing the crura, median prong on the cardinal plate, median septum, and mantle canals. CPC 10965, paratype.
16. Interior of a broken brachial valve. CPC 10966; paratype.
- 17-21. Ventral, dorsal, anterior, posterior, and lateral views of the holotype. CPC 10967.
- 22-26. Ventral, dorsal, anterior, posterior, and lateral views of a paratype. CPC 10968.



## PLATE 38

### *Desquamatia (Synatrypa) kimberleyensis* (Coleman)

(Figures 1-22 from locality 37/2, Westwood Member, Cockatoo Formation, Westwood Creek. All specimens  $\times 1$ .)

#### Figures

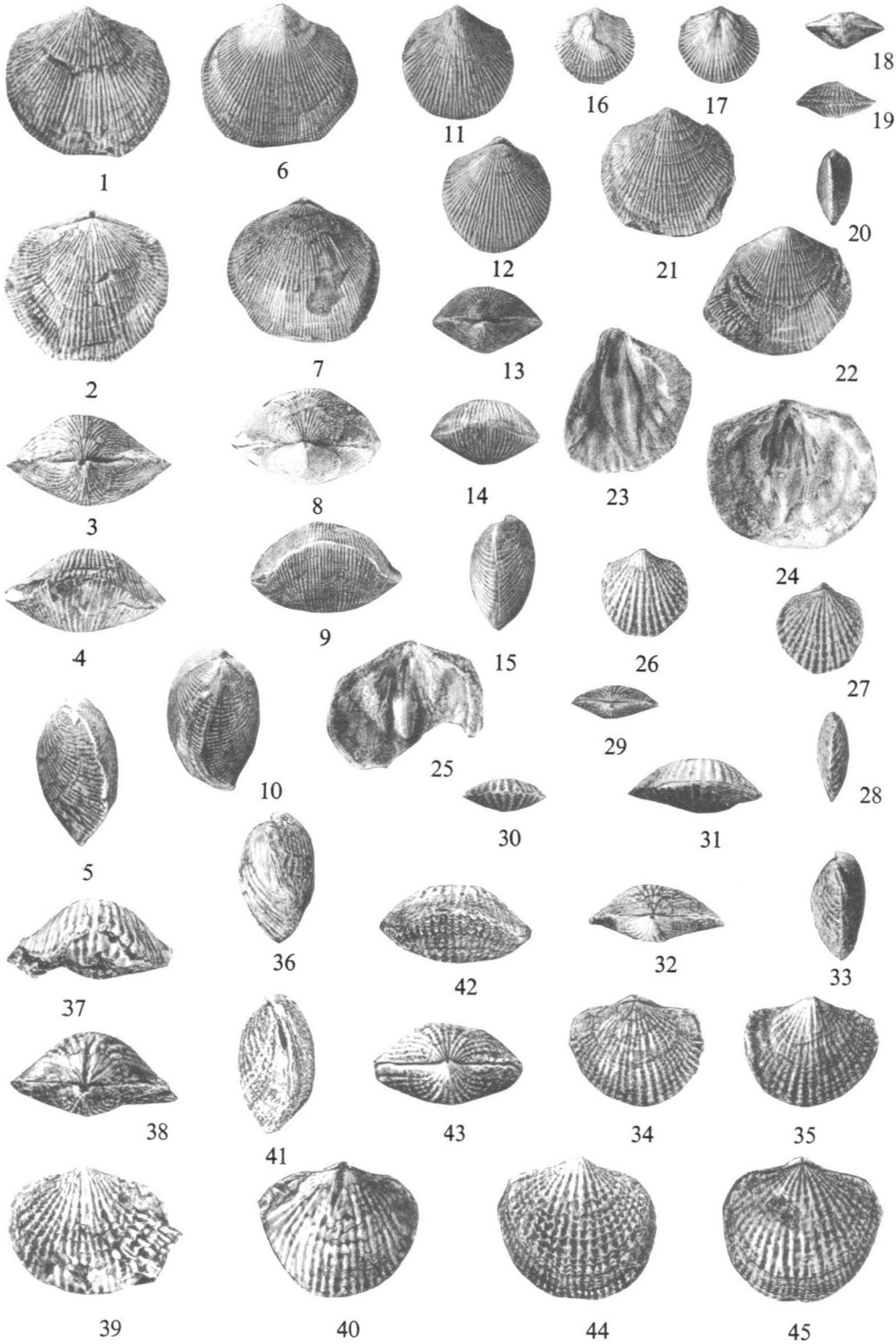
- 1-5. Ventral, dorsal, posterior, anterior, and lateral views of CPC 10969.
- 6-10. Ventral, dorsal, posterior, anterior, and lateral views of CPC 10970.
- 11-15. Ventral, dorsal, posterior, anterior, and lateral views of CPC 10971.
- 16-20. Ventral, dorsal, posterior, anterior, and lateral views of CPC 10972.
- 21. Pedicle valve exterior showing well-defined growth lamellae. CPC 10973.
- 22. Pedicle valve exterior with frills arising from the extremities of growth lamellae. CPC 10974.

### *Spinatrypa prideri larga* subsp. nov.

(Figures 23-45 from locality 37/2, Westwood Member, Cockatoo Formation, Westwood Creek. All specimens  $\times 1$ .)

#### Figures

- 23. Pedicle valve exterior with branching canals of vascula myaria, and pitted areas of vascula genitalia. CPC 10975, paratype.
- 24. Pedicle valve interior showing the muscle field, pedicle cavity, and pitted areas of vascula genitalia. CPC 10976, paratype.
- 25. Pedicle valve interior with a high callus at the front of the muscle field. CPC 10977, paratype.
- 26-30. Ventral, dorsal, lateral, posterior, and anterior views of a juvenile specimen. CPC 10978, paratype.
- 31-35. Anterior, posterior, lateral, dorsal, and ventral views of CPC 10979, a paratype.
- 36-40. Lateral, anterior, posterior, ventral, and dorsal views of a paratype. Note the large spines in Fig. 39. CPC 10980.
- 41-45. Lateral, anterior, posterior, ventral, and dorsal views of the holotype. CPC 10981.



## PLATE 39

### *Cardiothyris bisulcata* gen. et sp. nov.

(Figures 1-21 from locality 7/1, Ningbing Limestone (Tournaisian part), Ningbing Range.  
× 1.5.)

#### Figures

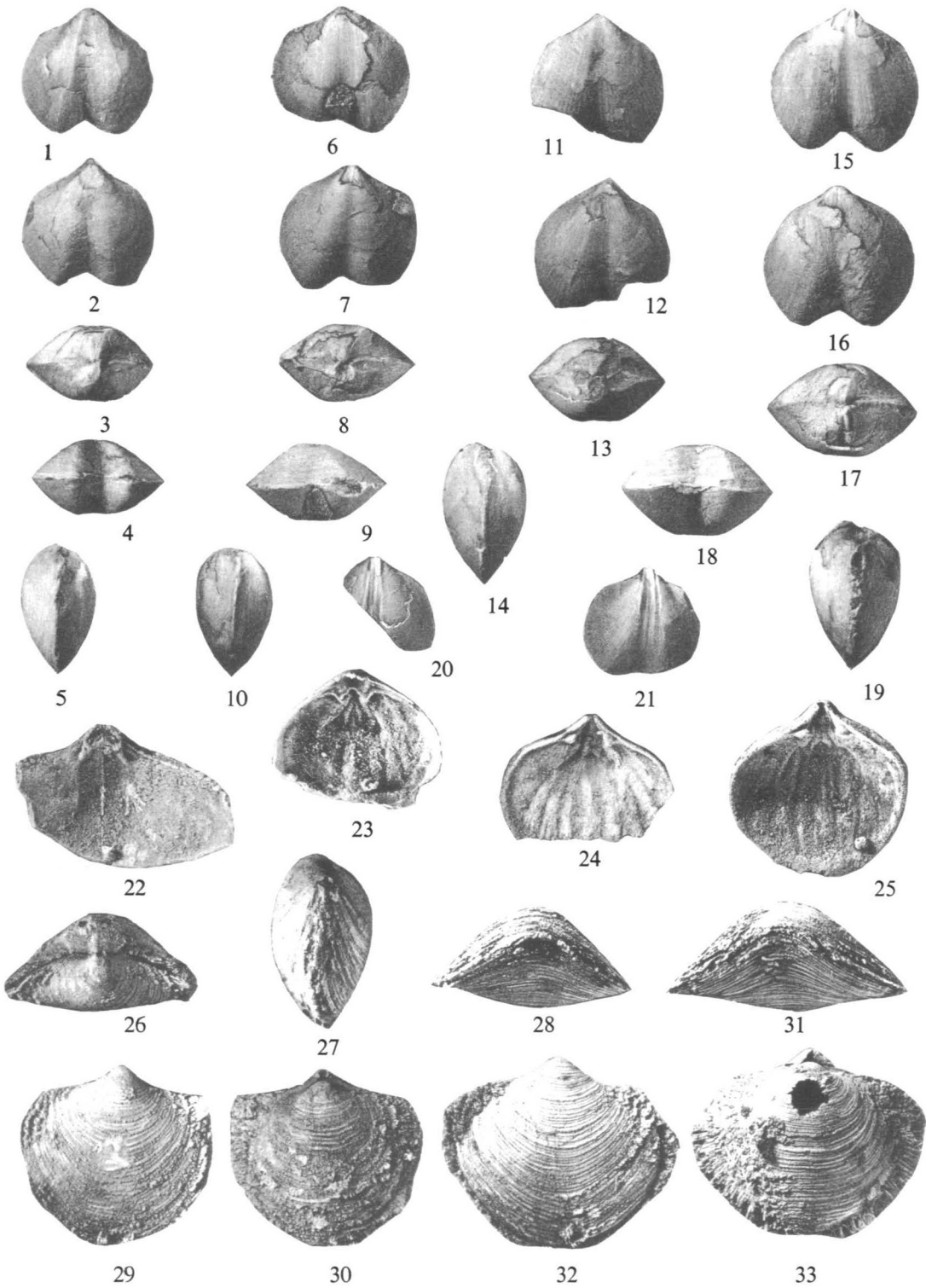
- 1-5. Ventral, dorsal, posterior, anterior, and lateral views of paratype CPC 8242.
- 6-10. Ventral, dorsal, posterior, anterior, and lateral views of paratype CPC 8243.
- 11-14. Ventral, dorsal, posterior, and lateral views of a paratype. Note the fine radial capillae. CPC 8244.
- 15-19. Ventral, dorsal, posterior, anterior, and lateral views of the holotype. CPC 8245.
- 20. Part of an internal mould of a pedicle valve. Note the short dental plates. CPC 8246, paratype.
- 21. Internal mould of a pedicle valve. CPC 8247, paratype.

### *Cleiothyridina gloveri* Thomas

(Figures 22-33 from locality 101/2, Burt Range Formation, 6 miles west of Mount Septimus.  
Figure 22 is × 4, Figures 23-33 are × 2.)

#### Figures

- 22. Silicified brachial valve interior showing the cardinal plate, apical foramen, and median ridge. CPC 8253.
- 23. Silicified shell interior showing the apical portion of the brachial valve, and the interior of the pedicle valve. CPC 8250.
- 24, 25. Two silicified pedicle valve interiors with well-defined mantle canals radiating from the muscle field. Note the two calluses at the posterior of the pedicle cavity. CPC 8252 and CPC 8251, respectively.
- 26-30. Posterior, lateral, anterior, ventral, and dorsal views of a silicified shell. CPC 8248.
- 31-33. Anterior, ventral, and dorsal views of a silicified shell. Note the flat spines arising from the concentric lamellae. CPC 8249.



## PLATE 40

### *Cleiothyridina minilya* Thomas

(Figures 1-4 from the Utting Calcarene, Utting Gap; Figures 5-15 from locality 102/4, Enga Sandstone, northern end of Enga Ridge.)

#### Figures

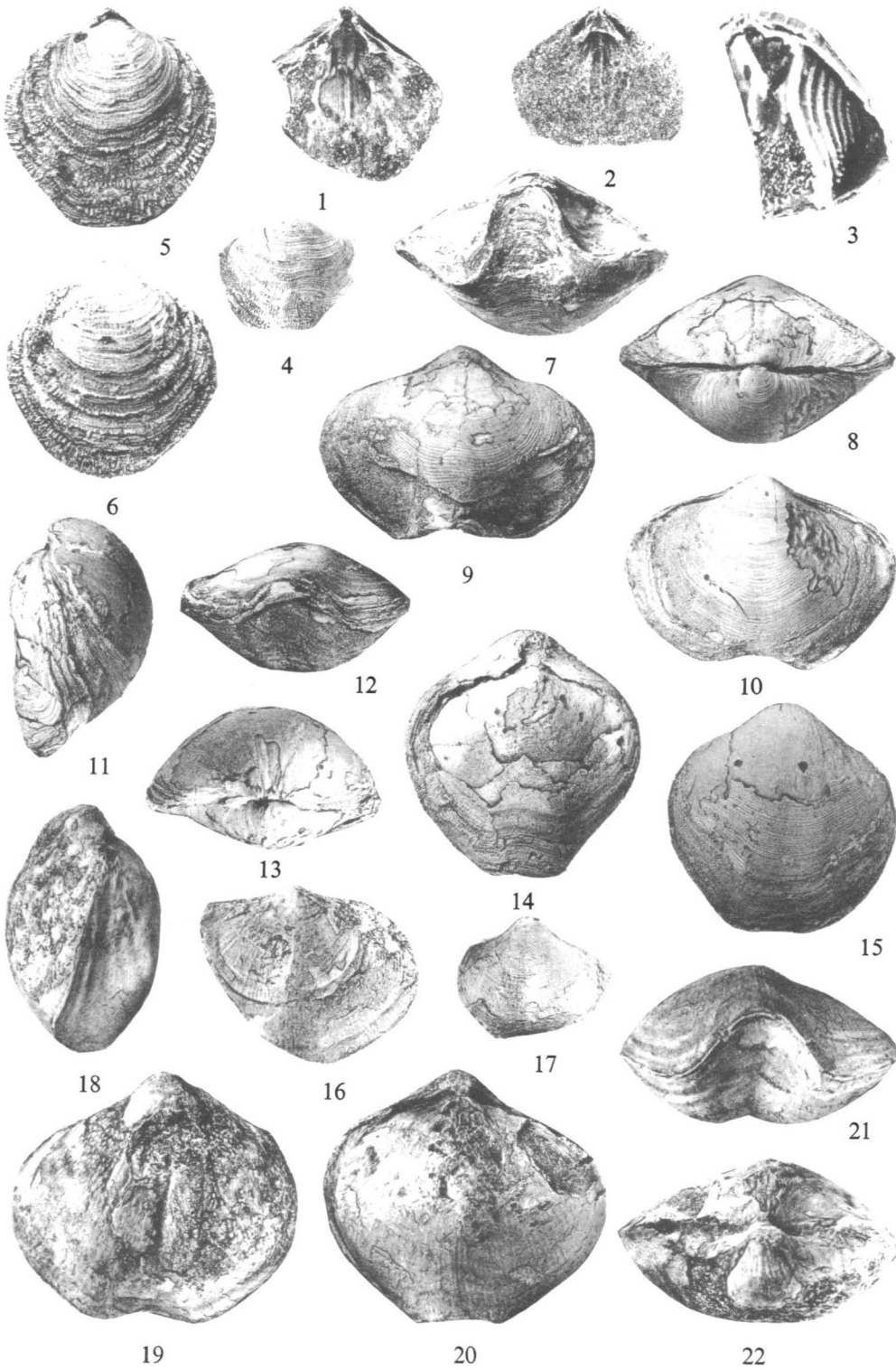
1. Silicified pedicle valve interior. Note the calluses between the pedicle cavity and the muscle field. CPC 8237; locality 108/3;  $\times$  2.
2. Silicified brachial valve interior. CPC 8238; locality 108/3;  $\times$  2.
3. Anterior view of the spire and the jugum. Note the spines on the jugum and the volutions of the spire. CPC 8239; locality 108/4;  $\times$  3.
4. Brachial valve exterior. CPC 8240; locality 108/0;  $\times$  1.
- 5, 6. Dorsal and ventral views of a juvenile specimen showing spines on the exterior. CPC 8234;  $\times$  2.25.
- 7-10. Anterior, posterior, dorsal, and ventral views of a transverse specimen. CPC 8235;  $\times$  1.
- 11-15. Lateral, anterior, posterior, dorsal, and ventral views of a round individual. CPC 8236;  $\times$  1.

### *Cleiothyridina?* sp.

(Figures 16-22 from locality 305/1, Burvill Beds, 1.5 miles northeast of Ningbing Homestead. All specimens  $\times$  0.8.)

#### Figures

16. Partly decorticated brachial valve exterior. CPC 8241.
17. Pedicle valve exterior. CPC 8651.
- 18-22. Lateral, ventral, dorsal, anterior, and posterior views of an almost completely decorticated specimen. CPC 8652.





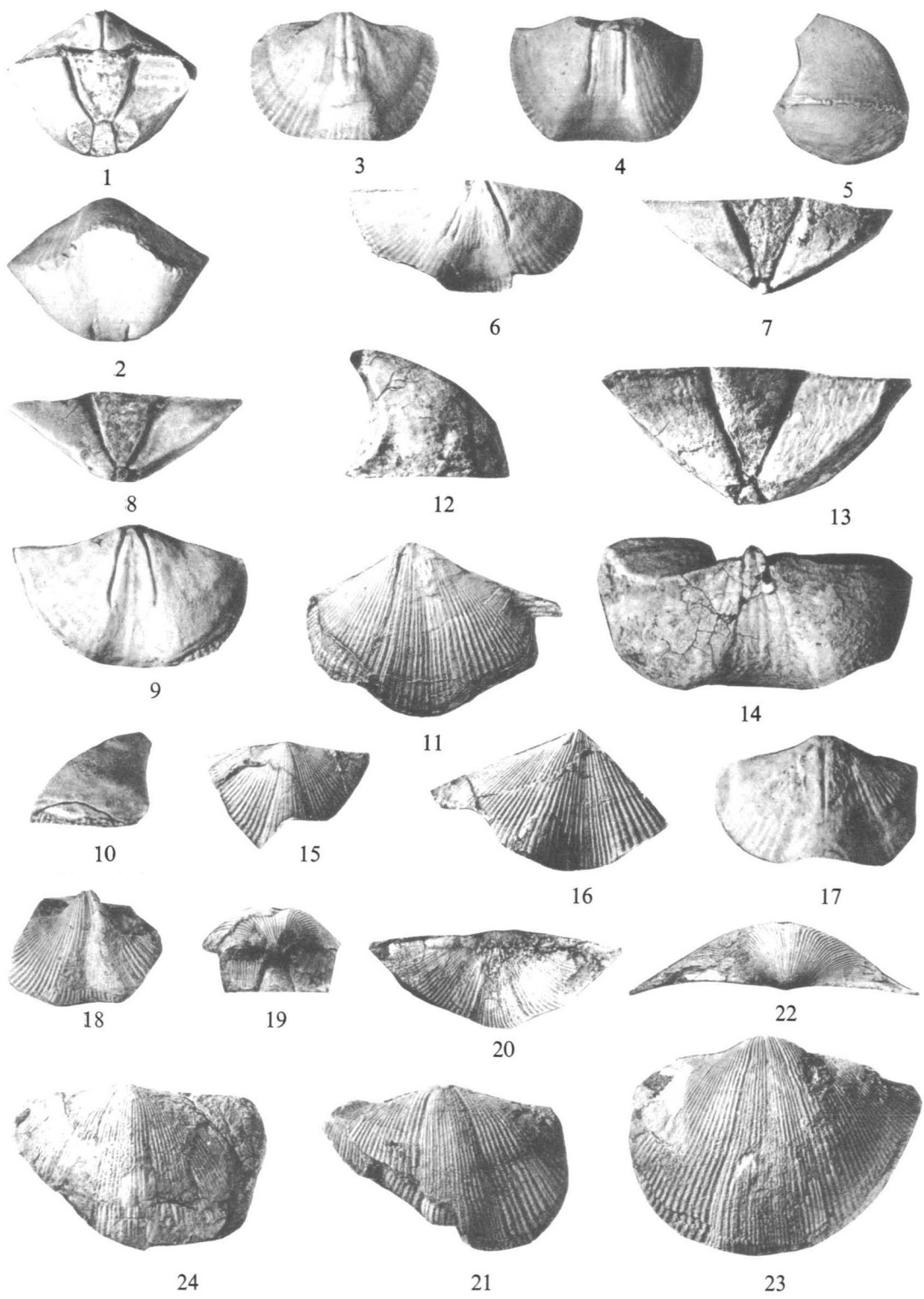
## PLATE 41

### *Cyrtospirifer ningbingensis* sp. nov.

(Figures 1-17 from locality 140/1; Figures 18-24 from locality 141/1; Ningbing Limestone (Famennian part), Ningbing Range.  $\times 1$ .)

#### Figures

- 1-5. Posterior, anterior, dorsal, ventral, and lateral views of an internal mould. This specimen is not as wide as most from locality 1/140. CPC 8139, paratype.
- 6, 7. Ventral and posterior views of the internal mould of a pedicle valve. CPC 8140, paratype.
- 8-11. Posterior, ventral, lateral, and ventral interior views of the holotype. Figs 8, 9, and 10 are internal moulds, and Fig. 11 is a rubber cast of the counterpart. CPC 8141, holotype.
- 12-14. Lateral, posterior, and ventral views of the internal mould of a pedicle valve showing the typically high ventral interarea. CPC 8142, paratype.
15. Rubber cast of a brachial valve exterior. CPC 8143, paratype.
16. Rubber cast of a pedicle valve exterior. CPC 8144, paratype.
17. Internal mould of a brachial valve showing the median ridge, and two pairs of adductor muscle scars. CPC 8145, paratype.
- 18, 19. Ventral and posterior views of a pedicle valve. Note the lower ventral interarea, and the more incurved umbo when compared with specimens from locality 140/1. CPC 8146.
- 20, 21. Posterior and dorsal views of a brachial valve. CPC 8147.
- 22, 23. Posterior and dorsal views of a brachial valve. CPC 8148.
24. Brachial valve exterior. CPC 8149.



## PLATE 42

### *Cyrtospirifer ningbingensis* sp. nov.

(Figures 1-16 from locality 141/1, Ningbing Limestone (Famennian part), Ningbing Range.  
× 1.)

#### Figures

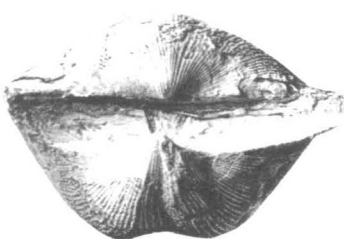
- 1-4. Ventral, dorsal, posterior, and lateral views of a pedicle valve. Note the relatively low ventral interarea, and the strongly incurved umbo. CPC 8133.
5. Posterior view of a pedicle valve showing the convex delthyrial plate. CPC 8134.
- 6-8. Posterior, lateral, and ventral views of a pedicle valve. CPC 8135.
- 9, 10. Ventral and posterior views of CPC 8136. The brachial valve is partly obscured by a productoid.
- 11-13. Lateral, posterior, and ventral views of a broken specimen. The high ventral interarea, almost straight cardinal margins, and gently incurved umbo resemble those in specimens from locality 140/1. CPC 8137.
- 14-16. Ventral, lateral, and posterior views of the exterior of a large pedicle valve. Note the strongly incurved umbo typical of many specimens from locality 141/1. CPC 8138.



1



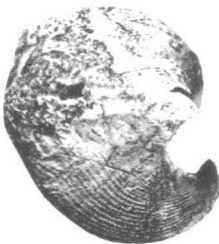
2



3



5



4



11



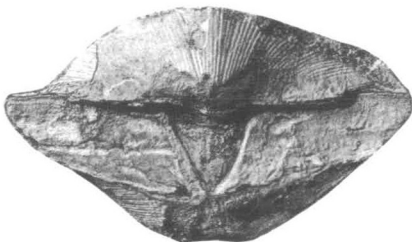
6



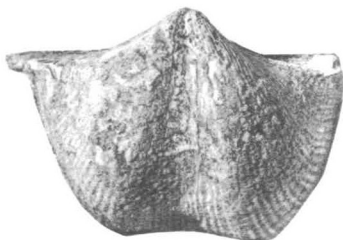
7



9



12



8



10



13



14



15



16

## PLATE 43

### *Cyrtospirifer ningbingensis* sp. nov.

(Figures 1-16 from locality 443/4, Ningbing Limestone (Famennian part), Jeremiah Hills.  $\times 1$ .)

#### Figures

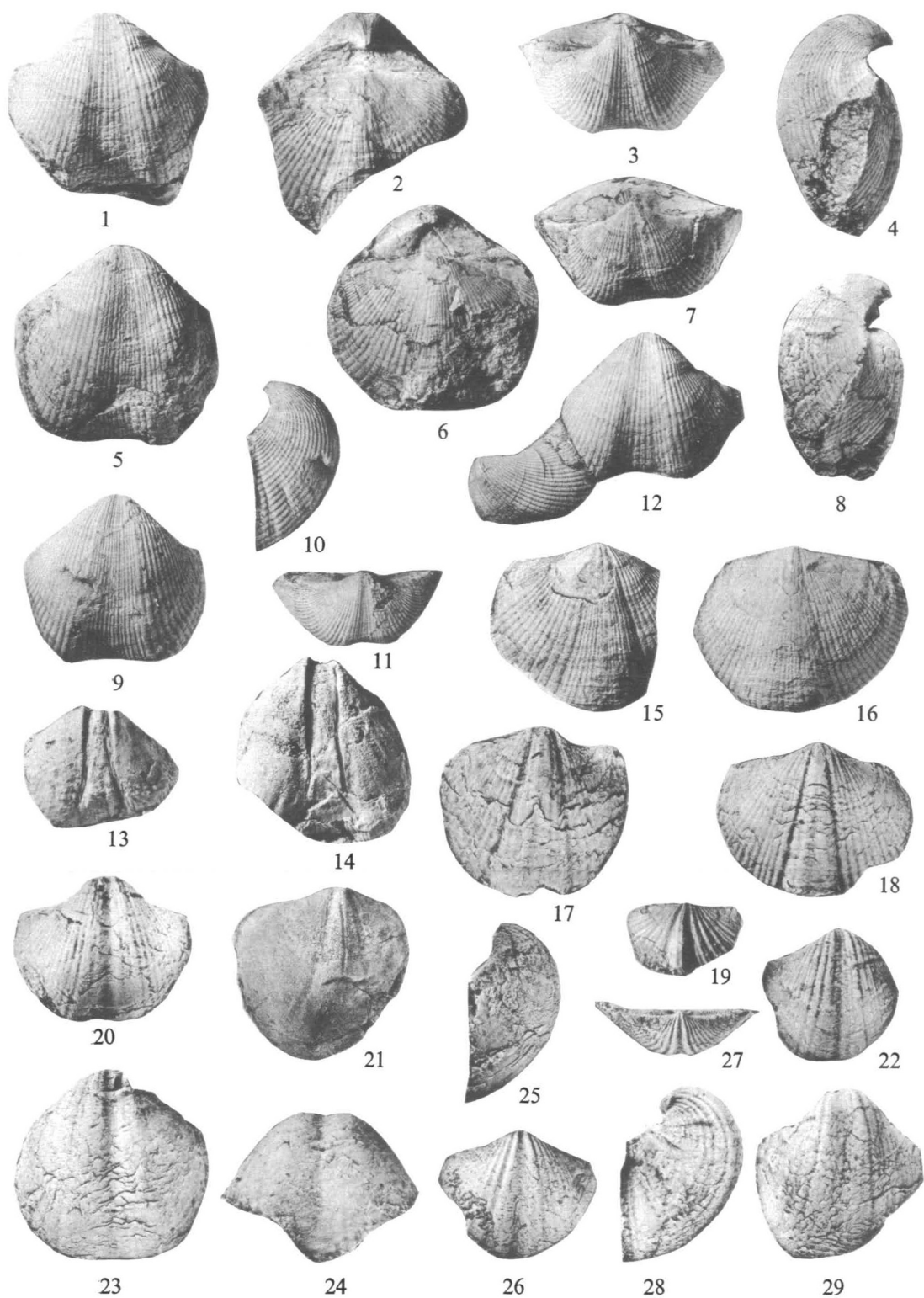
- 1-4. Ventral, dorsal, posterior, and lateral views of CPC 8125.
- 5-8. Ventral, dorsal, posterior, and lateral views of CPC 8126. Note the subovate outline, low ventral interarea, and incurved umbo.
- 9-11. Ventral, lateral, and posterior views of a pedicle valve exterior. CPC 8127.
12. Rubber cast of two pedicle valve exteriors. CPC 8128.
13. Internal mould of the posterior part of a pedicle valve showing long ventral adminicula. CPC 8129.
14. Internal mould of a pedicle valve. CPC 8130.
- 15-16. Two brachial valve exteriors. CPC 8131 and CPC 8132, respectively.

### *Austrochoristites levisulcatus* gen. et sp. nov.

(Figures 17-29 from locality 100/30, Burt Range Formation, 6.5 miles northwest of Mount Septimus.  $\times 1$ .)

#### Figures

17. A partly decorticated brachial valve exterior. CPC 8198.
18. Brachial valve exterior. CPC 8193, paratype.
19. Rubber cast of a juvenile brachial valve showing the dividing costae at the posterior of the valve. CPC 8197.
20. Pedicle valve exterior showing the smooth floor and accessory costae on the flanks of the sinus. The micro-ornament on this specimen is figured on Plate 50, fig. 23. CPC 8201, holotype.
21. Internal mould of a brachial valve showing the median ridge dividing well impressed inner adductor muscle scars. CPC 8195, paratype.
22. Pedicle valve exterior. CPC 8194, paratype.
- 23-25. Ventral, anterior, and lateral views of a partly decorticated pedicle valve. CPC 10982.
- 26, 27. Ventral and posterior views of a pedicle valve. Note the denticle grooves on the interarea. CPC 10983, paratype.
- 28, 29. Lateral and ventral views of a partly decorticated pedicle valve. CPC 10984.



## PLATE 44

### *Cyrtospirifer depressus* sp. nov.

(Figures 1-20 from locality 145/5, Buttons Beds, 7.5 miles northwest of Mount Septimus.  $\times 1$  unless otherwise indicated.)

#### Figures

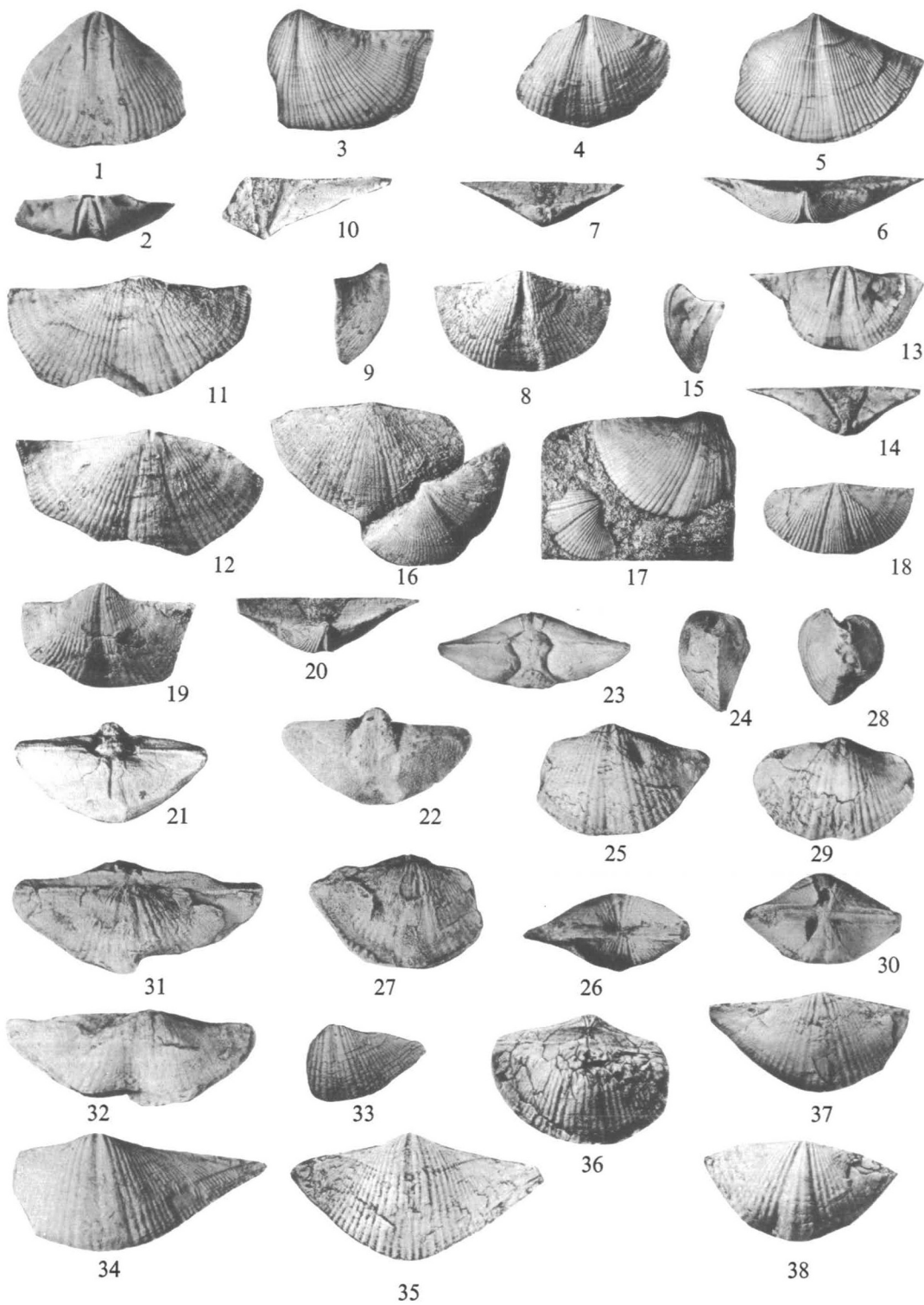
- 1, 2. Ventral and posterior views of an internal mould of a pedicle valve showing the ventral adminicula, and the narrow median ridge. CPC 8157, paratype.
3. Rubber cast of a pedicle valve exterior. CPC 8151.
4. Rubber cast of a pedicle valve exterior, a counterpart to the specimen in Fig. 10. CPC 8155, paratype.
- 5, 6. Rubber cast of a pedicle valve exterior, and a posterior view of the actual shell. Note the nearly orthocline interarea. CPC 8153, holotype.
- 7-9. Posterior, ventral, and lateral views of a pedicle valve having a nearly catacline interarea. CPC 8154, paratype.
10. Posterior view of a pedicle valve exterior showing the nearly orthocline interarea and the apical delthyrial plate. CPC 8155, paratype;  $\times 2$ .
- 11, 12. Rubber cast of the exterior, and an internal mould of the interior of brachial valve CPC 8156, a paratype.
- 13-15. Ventral, posterior, and lateral views of an internal mould of a pedicle valve. CPC 8158, paratype.
16. Rubber cast of the exterior of a brachial valve and a pedicle valve. CPC 8159.
17. Rubber cast of the exterior of two brachial valves. CPC 8160, paratypes.
18. Brachial valve exteriors. CPC 8161.
- 19, 20. Ventral and posterior views of a pedicle valve having an almost catacline interarea. CPC 8162.

### *Unispirifer laurelensis* (Thomas)

(Figures 21-38 from the Burt Range Formation. All  $\times 1$ .)

#### Figures

- 21-23. Dorsal, ventral, and posterior views of an internal mould. CPC 8163; locality 101/16, 4.5 miles west of Mount Septimus.
- 24-27. Lateral, ventral, posterior, and dorsal views of a partly decorticated shell. CPC 8164; locality 101/16.
- 28-30. Lateral, ventral, and posterior views of CPC 8165. Locality 101/16.
- 31, 32. Dorsal and ventral views of a distorted shell. CPC 8166; locality 101/16.
33. Rubber cast of part of a pedicle valve exterior showing the simple costate ornament in the sinus. CPC 8167; locality 101/18, 4.5 miles west of Mount Septimus.
34. Exterior of a large alate pedicle valve. CPC 8168; locality 101/18.
35. Pedicle valve exterior. CPC 8169; locality 101/18.
36. Dorsal view of CPC 8170. Locality 109/2, middle part of Enga Ridge.
- 37, 38. Two brachial valve exteriors. CPC 8171 and CPC 8172, respectively; locality 128/2, middle part of Enga Ridge.





## PLATE 45

### *Tenticospirifer columnaris* sp. nov.

#### Figures

- 1-5. Ventral, dorsal, posterior, lateral, and anterior views of paratype CPC 8173. Locality 12/4, Westwood Member, Westwood Creek;  $\times 1$ .
- 6-10. Ventral, dorsal, posterior, lateral, and anterior views of an adult specimen from locality 12/4. CPC 8174;  $\times 1$ .
- 11-15. Ventral, dorsal, posterior, lateral, and anterior views of the holotype. CPC 8175; locality 12/4;  $\times 2$ .
- 16-18. Dorsal, posterior, and lateral views of an adult specimen from locality 12/150. Note the incurved umbo, and the rounded posterolateral margins. CPC 8176;  $\times 1$ .
- 19, 20. Ventral and posterior views of a large pedicle valve from locality 12/4. CPC 8177;  $\times 1$ .
21. Brachial valve exterior of CPC 8178. Locality 12/150;  $\times 1$ .
- 22, 23. Ventral and lateral views of a pedicle valve showing the costate ornament. CPC 8179; locality 12/150;  $\times 1$ .
- 24, 25. Ventral and posterior views of the internal mould of a pedicle valve. CPC 8180; locality 250/8, Hargreaves Member, Hargreaves Hills;  $\times 1$ .
26. Brachial valve interior. CPC 8181; locality 37/2, Westwood Member;  $\times 3$ .

### *Prospira incerta* Thomas

(Figures 27-38 from locality 102/4, Enga Sandstone, northern end of Enga Ridge.)

#### Figures

27. Silicified brachial valve interior showing the denticulate hinge, socket plates, and crura. CPC 8182;  $\times 2$ .
28. Silicified pedicle valve interior. CPC 8183;  $\times 2$ .
- 29-33. Anterior, posterior, ventral, dorsal, and lateral views of CPC 8184.  $\times 1$ .
- 34-38. Anterior, posterior, lateral, dorsal, and ventral views of CPC 8185.  $\times 1$ .



1



6



11



16



19



2



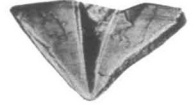
7



12



17



20



3



8



13



24



21



4



9



14



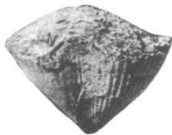
25



18



5



10



15



23



22



29



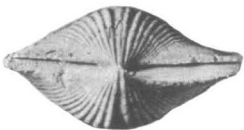
27



26



34



30



33



28



36



35



31



32



37



38

## PLATE 46

### *Spirifer otwayi* sp. nov.

(Figures 1-17 from locality 7/1, Ningbing Limestone (Tournaisian part), Ningbing Range.  
All specimens  $\times 1$ .)

#### Figures

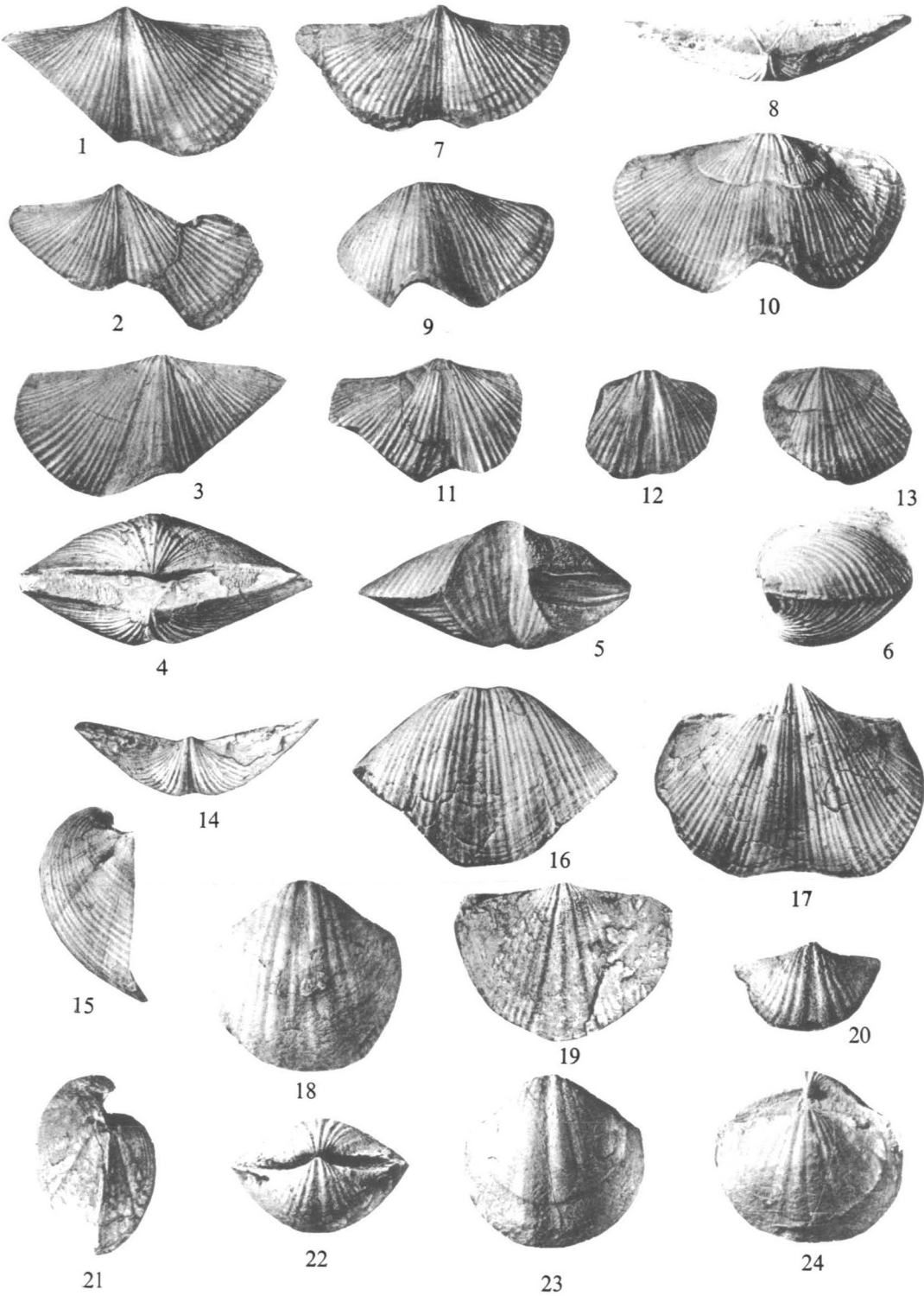
- 1-6. Ventral, dorsal, posterior, anterior, and lateral views of CPC 8166, the holotype. Fig. 2 is a rubber cast of the exterior of the pedicle valve, and the others are of the exterior of a partly decorticated shell.
- 7, 8. Ventral and posterior views of a pedicle valve exterior. CPC 8187; paratype.
9. Partly decorticated brachial valve exterior. CPC 8188, paratype.
10. Brachial valve exterior. CPC 8189, paratype.
11. Broken pedicle valve exterior. CPC 8190, paratype.
12. Internal mould of a pedicle valve showing the ventral adminicula. CPC 8191, paratype.
13. Broken brachial valve exterior. CPC 8192, paratype.
- 14-17. Posterior, lateral, anterior, and ventral views of a less transverse pedicle valve. CPC 8479, paratype.

### *Austrochoristites levisulcatus?* gen. et sp. nov.

(Figures 18-24 from locality 100/24, Burt Range Formation, 7 miles northwest of Mount Septimus.  $\times 1$ .)

#### Figures

18. Partly decorticated pedicle valve exterior. CPC 8200.
19. Brachial valve exterior showing the median furrow on the fold. CPC 10985.
20. Juvenile pedicle valve exterior. Note the smooth floor on the sinus. CPC 8199.
- 21-24. Lateral, posterior, ventral, and dorsal views of CPC 8202. Note the nearly orthocline interarea.



## PLATE 47

### *Spirifer* sp.

(Figures 1-6 from locality 306, Burvill Beds, Burvill Point. All  $\times 1$ .)

#### Figures

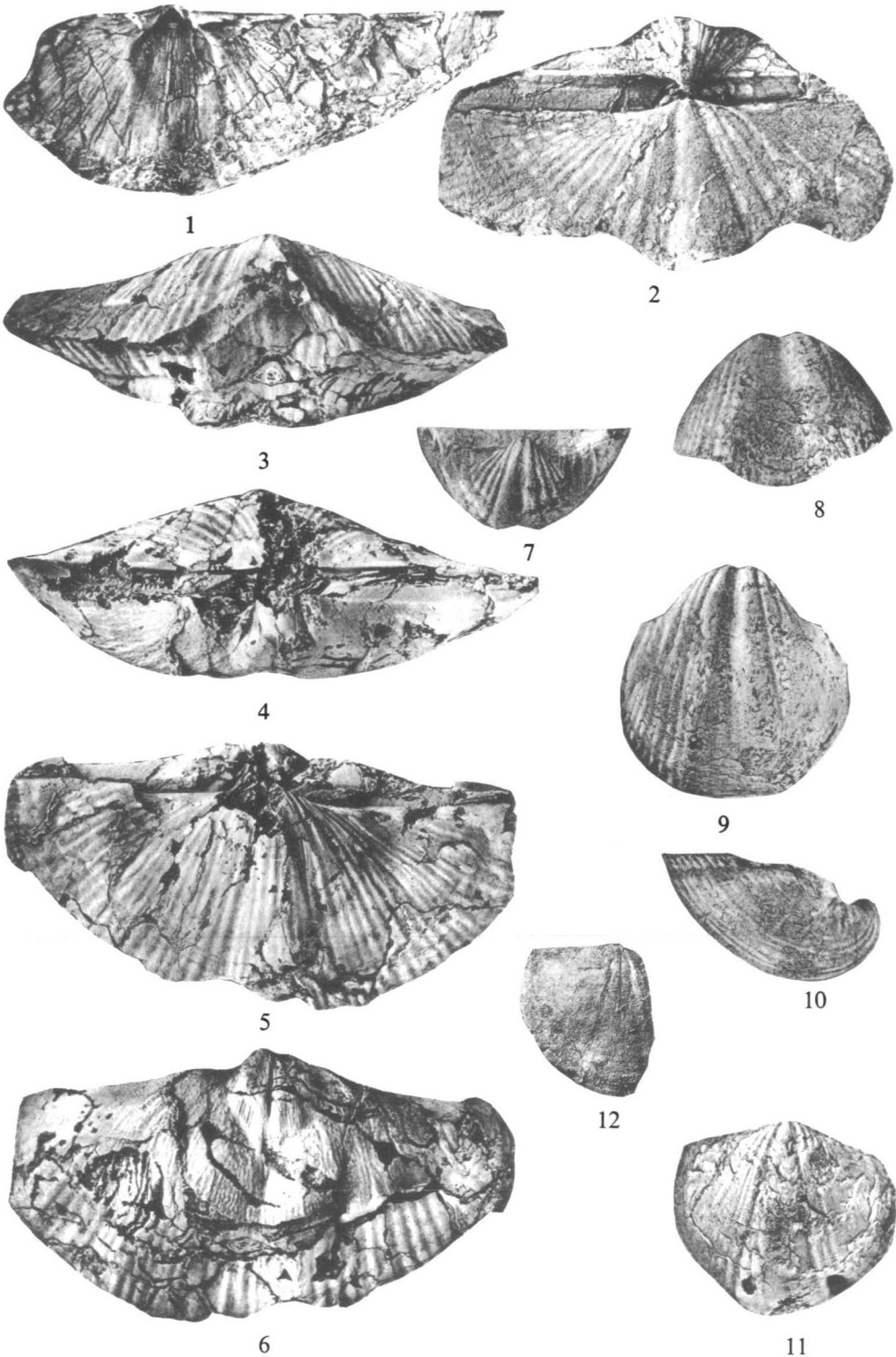
1. Rubber cast of a pedicle valve interior showing the muscle field and the radially arranged mantle canals. CPC 10988.
2. Rubber cast of the brachial valve exterior and the posterior part of the pedicle valve. CPC 10989.
- 3-6. Anterior, posterior, dorsal, and ventral views of a ferruginized internal mould. Note the mantle canals and ventral muscle field in Fig. 6. CPC 10990.

### *Austrochoristites levisulcatus* gen. et sp. nov.

(Figures 7-12 from the Burt Range Formation. All  $\times 1$ .)

#### Figures

- 7-10. Posterior, anterior, ventral, and lateral views of a pedicle valve. Note that the costae bordering the sinus are sharply defined posteriorly, and become lower anteriorly. CPC 10986; locality 101/10, 5 miles west of Mount Septimus.
11. Partly decorticated brachial valve exterior. CPC 10987; locality 101/10.
12. Internal mould of a brachial valve showing the median ridge and two pairs of adductor muscle scars; the outer adductor scars subtend linear mantle canals. CPC 8196; locality 117/1, Spirit Hill.



## PLATE 48

### *Podtsheremia? humilicostata* sp. nov

(Figures 1-6 from locality 306, Burvill Beds, Burvill Point; Figures 7-22 from locality 108/0; and Figures 23-27 from locality 107/1, Utting Calcarene, Utting Gap.  $\times 1$  unless otherwise specified.)

#### Figures

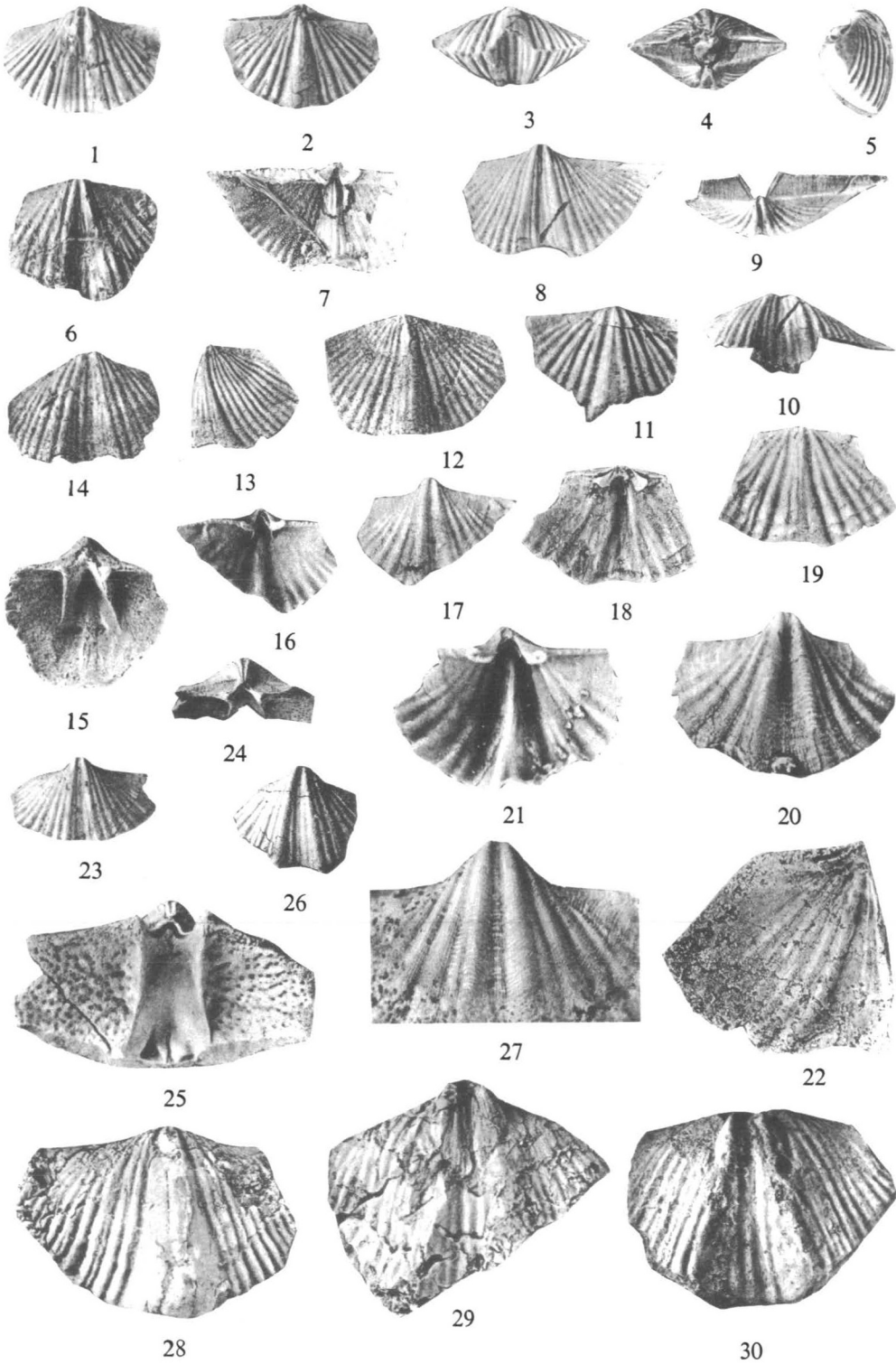
- 1-5. Ventral, dorsal, anterior, posterior, and lateral views of a ferruginized internal mould. CPC 10991.
6. Ferruginized internal mould of a pedicle valve. CPC 10992.
- 7-10. Internal, external, posterior, and anterior views of a silicified pedicle valve. CPC 10993, holotype.
11. External view of part of a silicified brachial valve. CPC 10994;  $\times 2$ .
12. Silicified brachial valve exterior. CPC 10995, paratype.
13. Broken silicified brachial valve exterior. The interior of the same valve is Fig. 22. CPC 10996, paratype.
14. Silicified pedicle valve exterior. CPC 10997.
15. Silicified pedicle valve interior showing the apical callus, ventral adminicula, and muscle field. CPC 10998, paratype;  $\times 2$ .
- 16, 17. Internal and external views of a small silicified pedicle valve. Note the denticulate hinge, the small apical plate between the adminicula, and the external micro-ornament. CPC 10999, paratype;  $\times 2$ .
- 18, 19. Internal and external views of a silicified brachial valve showing the apical structures, and the external ornament. CPC 11000, paratype;  $\times 2$ .
- 20, 21. External and internal views of a silicified pedicle valve showing the external micro-ornament, the teeth, the small apical plate, and the denticulate hinge. CPC 11001, paratype;  $\times 4$ .
22. Silicified brachial valve interior. CPC 10996, paratype;  $\times 2$ . Same specimen as in Fig. 13.
- 23-25. External, posterior, and internal views of a pedicle valve showing the hood-like cover at the apex of the delthyrium, and the extensive deposit of callus between the adminicula, CPC 11003. Fig. 25  $\times 2$ .
26. Pedicle valve exterior. CPC 11004.
27. Posterior part of a pedicle valve showing the external micro-ornament. CPC 11005;  $\times 4$ .

### *Podtsheremia? thomasi* sp. nov.

(Figures 28-30 from locality 306, Burvill Beds, Burvill Point.  $\times 1$ .)

#### Figures

28. Ferruginized internal mould of a brachial valve. CPC 11006.
29. Ferruginized internal mould of a pedicle valve. Note the muscle field. CPC 11007.
30. Ferruginized internal mould of a pedicle valve. CPC 11008.





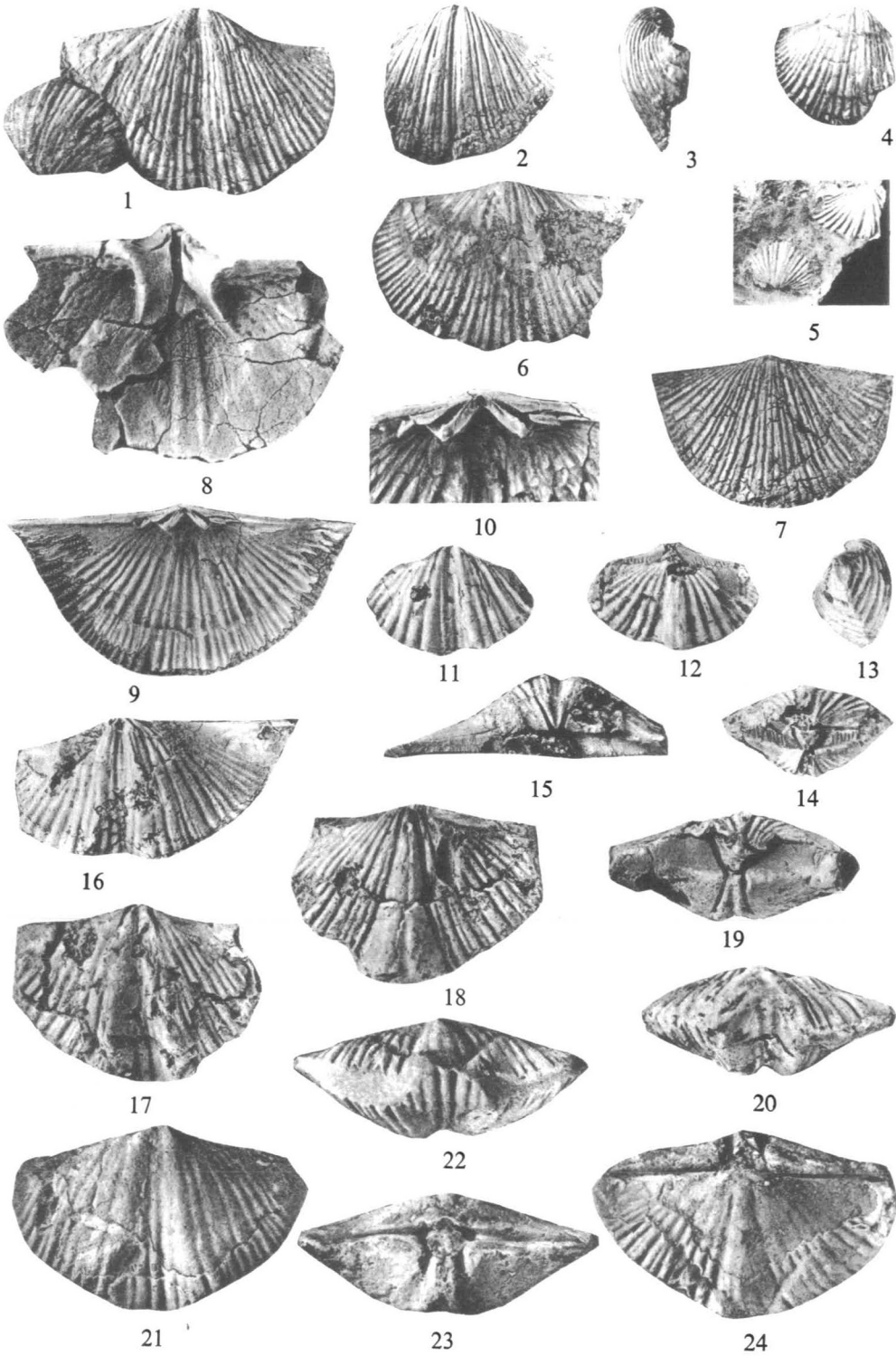
## PLATE 49

### *Podtsheremia? thomasi* sp. nov.

(Figures 1-10 from locality 301, Burvill Beds, Milligans Hills; Figures 11-24 from locality 306, Burvill Beds, Burvill Point.  $\times$  1 unless otherwise indicated.)

#### Figures

1. External view of two pedicle valves. CPC 11009a and b; the larger specimen CPC 11009a is the holotype.
- 2, 3. Ventral and lateral views of a pedicle valve. CPC 11010, paratype.
4. Pedicle valve exterior. CPC 11011, paratype.
5. Two small brachial valve exteriors. CPC 11012.
6. Exterior of an almost completely decorticated brachial valve. CPC 11013, paratype.
7. A weathered brachial valve exterior. CPC 11014, paratype.
8. Pedicle valve interior showing the thickened apex, ventral adminicula, dental plates, muscle field, and genital pits. CPC 11015;  $\times$  2.
- 9, 10. Two views of a brachial valve interior showing the apical structures. CPC 11016, paratype; Fig. 10  $\times$  2.
- 11-14. Ventral, dorsal, lateral, and posterior views of a small ferruginized internal mould. Note the denticle grooves. CPC 11017.
- 15, 16. Posterior and ventral views of a ferruginized internal mould of a pedicle valve. CPC 11018.
- 17-20. Ventral, dorsal, posterior, and anterior views of a ferruginized internal mould. CPC 11019.
- 21-24. Ventral, anterior, posterior, and dorsal views of a ferruginized internal mould. CPC 11020.



## PLATE 50

### *Tylothyris transversa* sp. nov.

(Figures 1-19 from locality 102/4, Enga Sandstone, northern end of Enga Ridge. All specimens  $\times 1$ .)

#### Figures

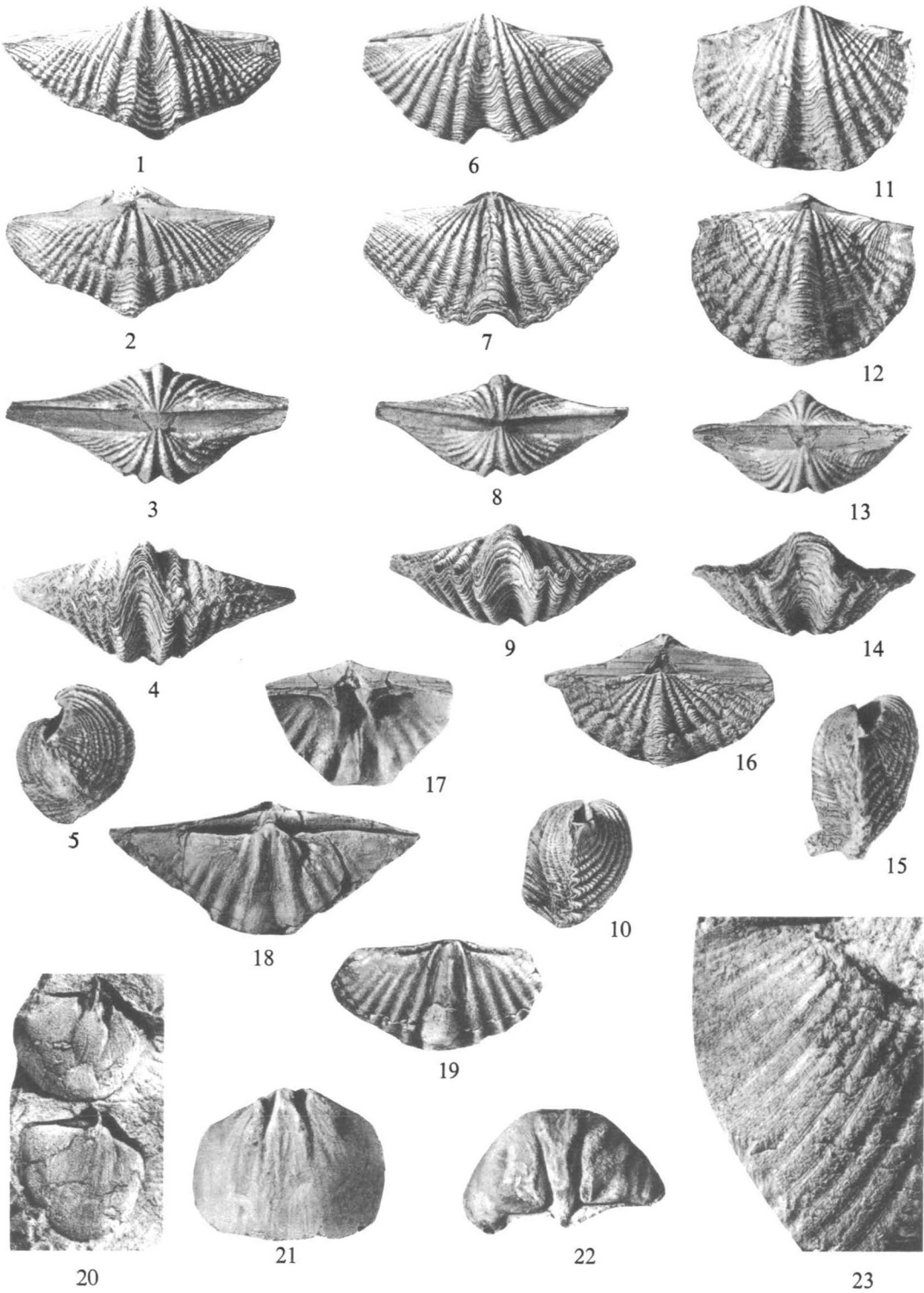
- 1-5. Ventral, dorsal, posterior, anterior, and lateral views of the holotype. CPC 8203.
- 6-10. Ventral, dorsal, posterior, anterior, and lateral views of paratype CPC 8204.
- 11-15. Ventral, dorsal, posterior, anterior, and lateral views of a subquadrate individual. CPC 8205, paratype.
16. Dorsal view of CPC 8206 showing the ventral interarea.
17. Pedicle valve interior showing the low median septum emerging from beneath the apical callus. CPC 8207, paratype.
18. Internal mould of a pedicle valve. CPC 8208.
19. Internal mould of a brachial valve. CPC 8209.

### *Austrochoristites levisulcatus* gen. et sp. nov.

(Figures 20-23 from the Burt Range Formation.  $\times 1$  unless otherwise indicated.)

#### Figures

20. Internal moulds of two pedicle valves. CPC 8210; locality 117/1, Spirit Hill.
- 21, 22. Ventral and posterior views of an internal mould of the pedicle valve showing the long parallel adminicula. CPC 8211, paratype; locality 100/30, 6.5 miles northwest of Mount Septimus.
23. External micro-ornament on the holotype. CPC 8201; locality 100/30;  $\times 4$ .



## PLATE 51

### *Tangshanella? fasciculata* sp. nov.

(Figures 1-15 from locality 110/7, Septimus Limestone, Mount Zimmermann, Central Burt Range. All specimens  $\times 1$ .)

#### Figures

- 1-3. Ventral, dorsal, and lateral views of a paratype. Note the convex pseudodeltidium. CPC 11021.
- 4-6. Ventral, posterior and lateral views of the holotype. The projection beneath Fig. 6 is a separate brachial valve (Fig. 7). CPC 11022.
- 7. Brachial valve exterior. CPC 11023.
- 8-10. Ventral, posterior, and lateral views of a paratype. CPC 11024.
- 11, 12. Ventral and posterior views of a paratype. CPC 11025.
- 13-15. Ventral, posterior, and dorsal views of a pedicle valve. CPC 11026, paratype.
- 16. Brachial valve exterior. CPC 11027; locality 110/6, Septimus Limestone, from the same section as locality 110/7.

### *Voiseyella? sp.*

(Figures 17-23 from locality 108/0, Utting Calcarenite, Utting Gap. All specimens  $\times 2$ .)

#### Figures

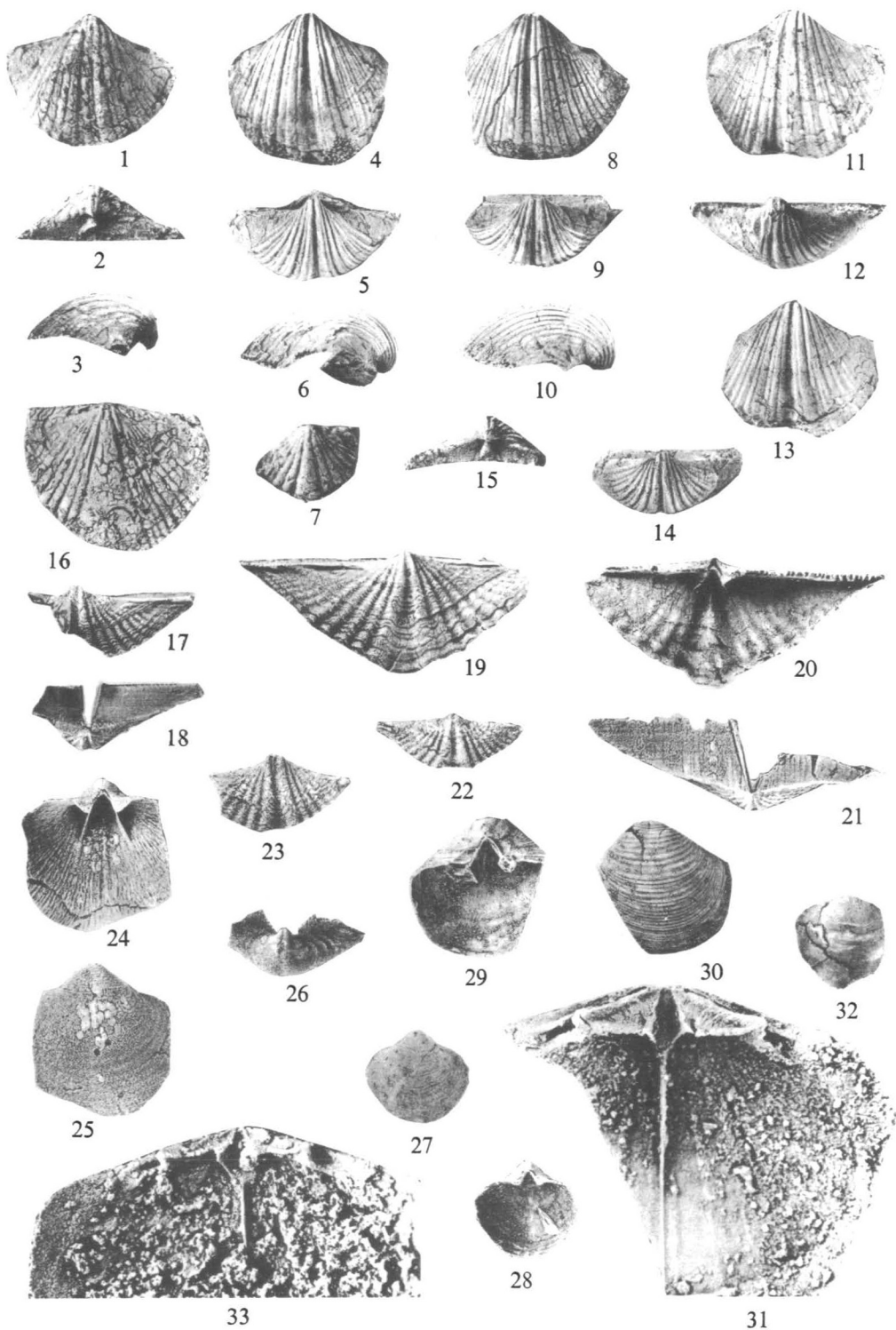
- 17, 18. Ventral and posterior views of a broken silicified pedicle valve. CPC 11028.
- 19-21. External, internal, and posterior views of a silicified pedicle valve. Note the subdelthyrial plate, high interarea, and denticulate hinge. CPC 11029.
- 22. Pedicle valve exterior. CPC 11030.
- 23. Pedicle valve exterior. CPC 11031.

### *Torynifer? sp.*

(Figures 26-33 from locality 108/0, Utting Calcarenite, Utting Gap. All specimens  $\times 1$  unless otherwise indicated.)

#### Figures

- 24, 25. Interior and exterior of a silicified pedicle valve. CPC 11032; locality 108/4, Utting Calcarenite, Utting Gap.
- 26-28. Posterior, exterior, and interior views of a silicified pedicle valve. CPC 11033.
- 29, 30. Internal and external views of a silicified pedicle valve. CPC 11034.
- 31. Brachial valve interior showing the septalium-like structure formed by the inner margins of the crural plates joining with the median septum. CPC 11035;  $\times 6$ .
- 32, 33. Exterior and posterior part of the interior of a silicified brachial valve. CPC 11036; Fig. 33  $\times 6$ .



## PLATE 52

### *Litothyris alticostata* gen. et sp. nov.

(Figures 1-14 and 16-17 from locality 443/22, Ningbing Limestone (Famennian part), Jeremiah Hills. All specimens  $\times 1$ .)

#### Figures

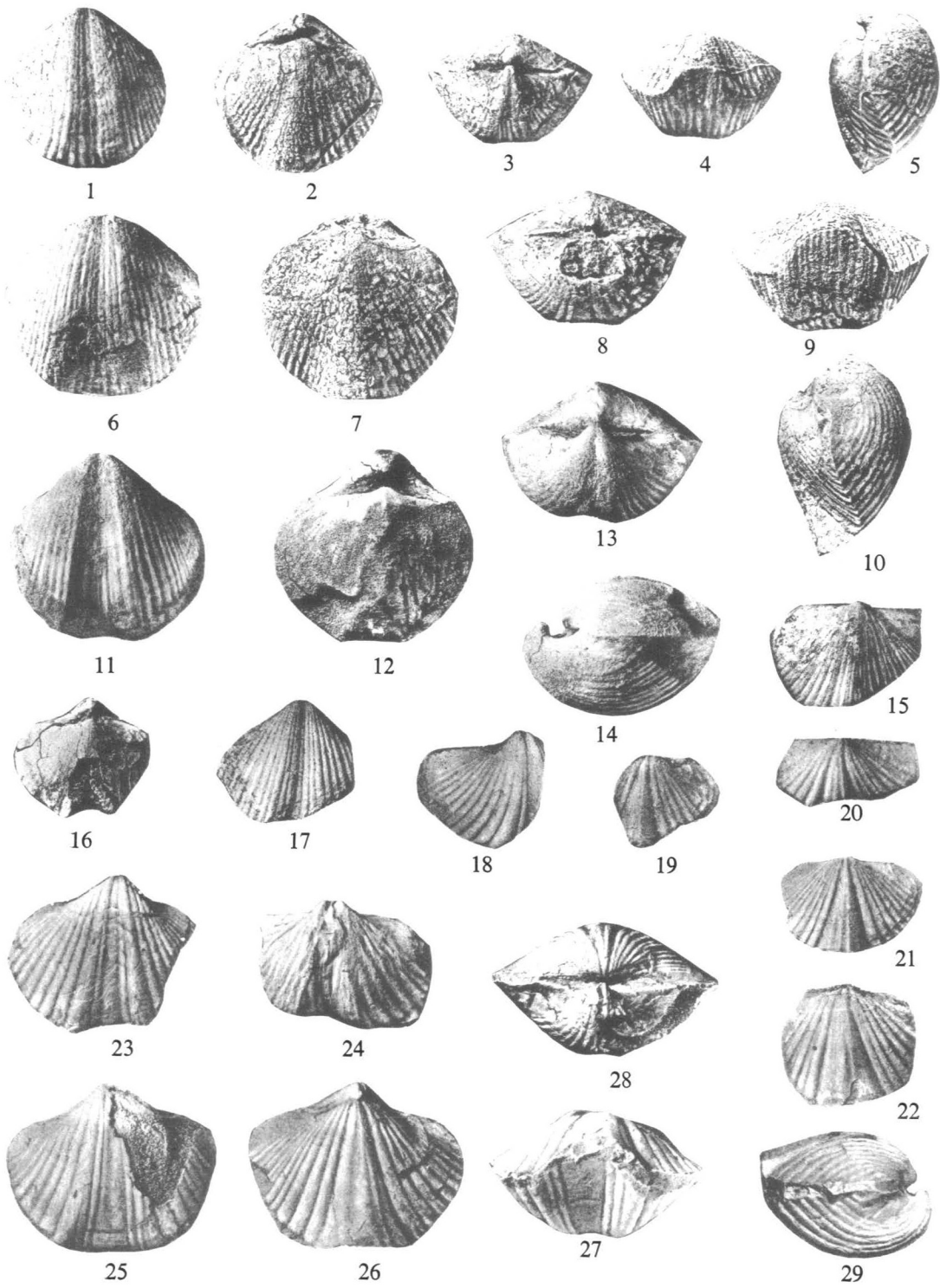
- 1-5. Ventral, dorsal, posterior, anterior, and lateral views of the holotype. CPC 8220.
- 6-10. Ventral, dorsal, posterior, anterior, and lateral views of paratype CPC 8221.
- 11-14. Ventral, dorsal, posterior, and lateral views of a partly decorticated shell. CPC 8222, paratype.
- 15. Portion of a brachial valve exterior. CPC 8223; locality 443/13.
- 16. Dorsal view of a partly decorticated shell showing part of the spire. CPC 8224.
- 17. Pedicle valve exterior. CPC 8225.

### *Brachythyris planulata* sp. nov.

(Figures 18-29 from locality 7/1 (Tournaisian part), Ningbing Limestone, Ningbing Range. All specimens  $\times 1$ .)

#### Figures

- 18. Rubber cast of part of a pedicle valve exterior. CPC 8226.
- 19. Rubber cast of part of a brachial valve exterior. CPC 8227.
- 20. Rubber cast of a brachial valve exterior. CPC 8228.
- 21. Brachial valve exterior showing the median furrow on the fold. CPC 8229, paratype.
- 22. Brachial valve exterior. CPC 8230.
- 23. Pedicle valve exterior showing the flat floor and plicate flanks on the sinus. CPC 8231, paratype.
- 24. Internal mould of a pedicle valve showing the muscle field, radiating linear canals of vascula genitalia arising from the flanks of the muscle field, and vascula media arising from the front of the muscle field. CPC 8232, paratype.
- 25-29. Ventral, dorsal, anterior, posterior, and lateral views of the holotype. CPC 8233.





## PLATE 53

### *Eomartiniopsis costata* sp. nov.

(Figures 1-15 from locality 102/4, Enga Sandstone, northern end of Enga Ridge.  $\times 1$  unless otherwise indicated.)

#### Figures

- 1-4. Ventral, dorsal, posterior, and lateral views of the holotype. Note the weakly costate ornament. CPC 8212.
- 5-8. Ventral, dorsal, posterior, and lateral views of paratype CPC 8213.
9. Pedicle valve exterior showing well-defined costae on the lateral slopes, and accessory costae on the flanks of the sinus. CPC 8214, paratype.
10. Dorsal view of a partly crushed shell showing the pseudodeltidium at the apex of the delthyrium. CPC 8215, paratype.
- 11, 12. Ventral and dorsal views of a shell lacking costae. Note the radial lirae and concentric growth lines. CPC 8216, paratype.
13. Silicified pedicle valve interior showing the dental plates, adminicula, and the muscle field. CPC 8217, paratype;  $\times 2$ .
14. Interior of a silicified pedicle valve. CPC 8218, paratype;  $\times 2$ .
15. Apex of the brachial valve interior showing the remains of the cardinal process, the socket plates, and the crura. CPC 8219, paratype;  $\times 3$ .



1



2



3



5



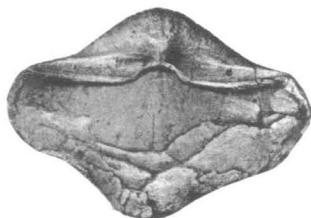
6



4



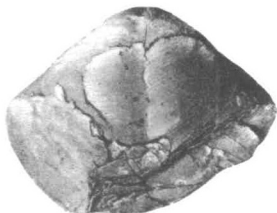
9



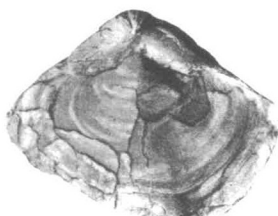
10



7



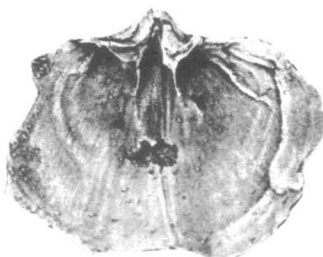
11



12



8



13



15



14

## PLATE 54

### *Syringothyris* sp. cf. *S. spissa* Glenister

#### Figures

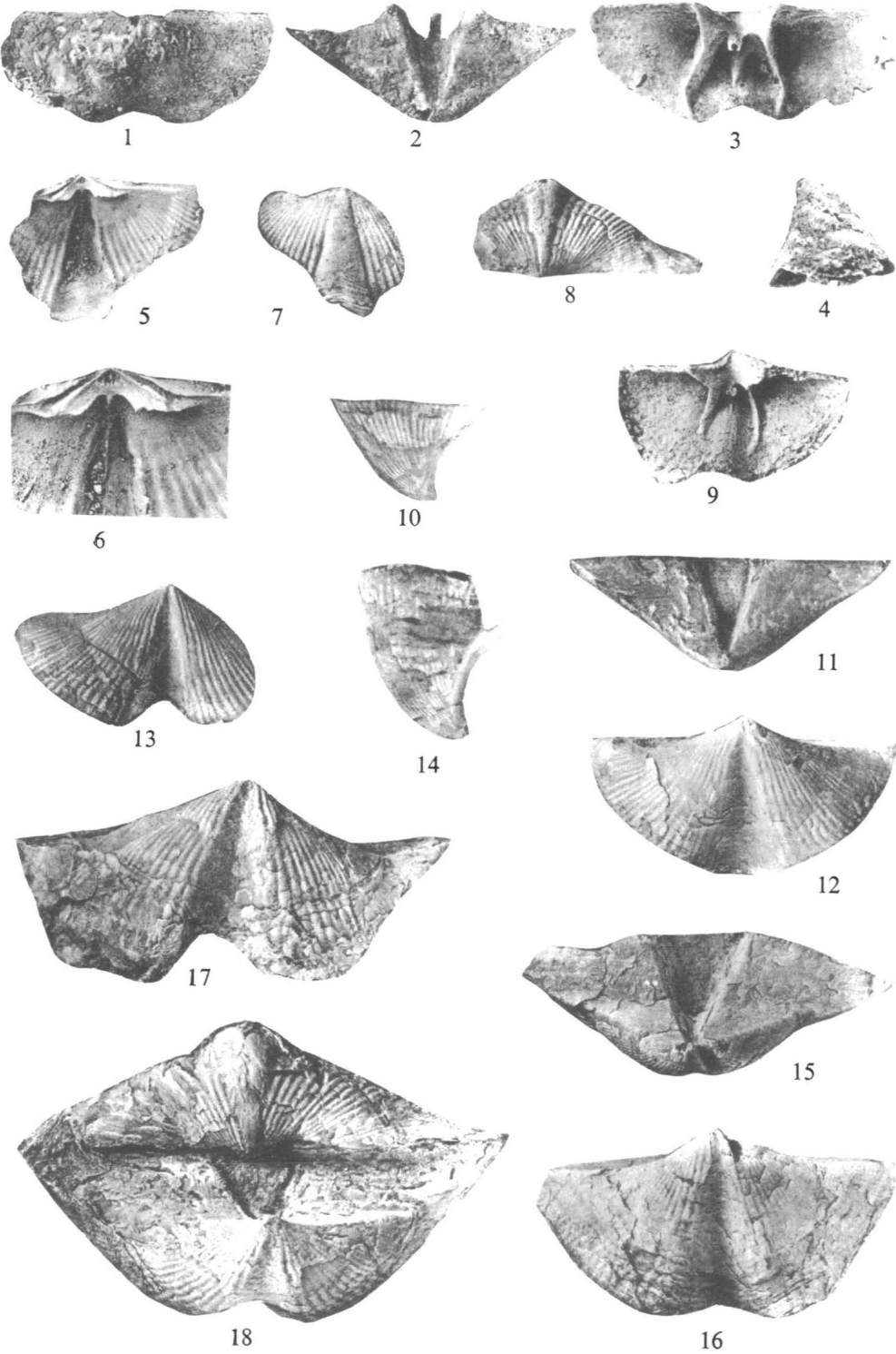
- 1-4. Ventral, posterior, internal, and lateral views of a silicified pedicle valve. Note the callus at the posterior of the muscle field in Fig. 3. CPC 11037; locality 108/3, Utting Calcarenite, Utting Gap;  $\times 1$ .

### *Syringothyris fontanalis* sp. nov.

(Figures 5-18 from the Burvill Beds.  $\times 1$  unless otherwise indicated.)

#### Figures

- 5-7. Rubber cast of the interior and exterior of a brachial valve. Fig. 6 is an enlargement ( $\times 2$ ) of Fig. 5, and shows the cardinalia and the short septum-like ridge emerging from beneath the cardinal process. CPC 11038; locality 453/7, Burvill Point.
8. Posterior view of a brachial valve. CPC 11039, paratype; locality 25, 2.5 miles east-northeast of Point Spring in the Weaber Range.
9. Rubber cast of a pedicle valve interior showing the syrx and other apical features. Note the small callus at the posterior of the muscle field. CPC 11040; locality 453/5, Burvill Point.
- 10-13. Lateral, posterior, and ventral views of CPC 11041. Fig. 13 is a rubber cast of the counterpart of Fig. 12. Holotype; locality 25.
- 14-16. Lateral, posterior, and ventral views of a partly decorticated pedicle valve. CPC 11042; paratype; locality 25.
- 17, 18. Ventral and posterior views of a partly decorticated specimen. CPC 11043; locality 435/0, 5 miles northeast of Point Spring, Weaber Range.



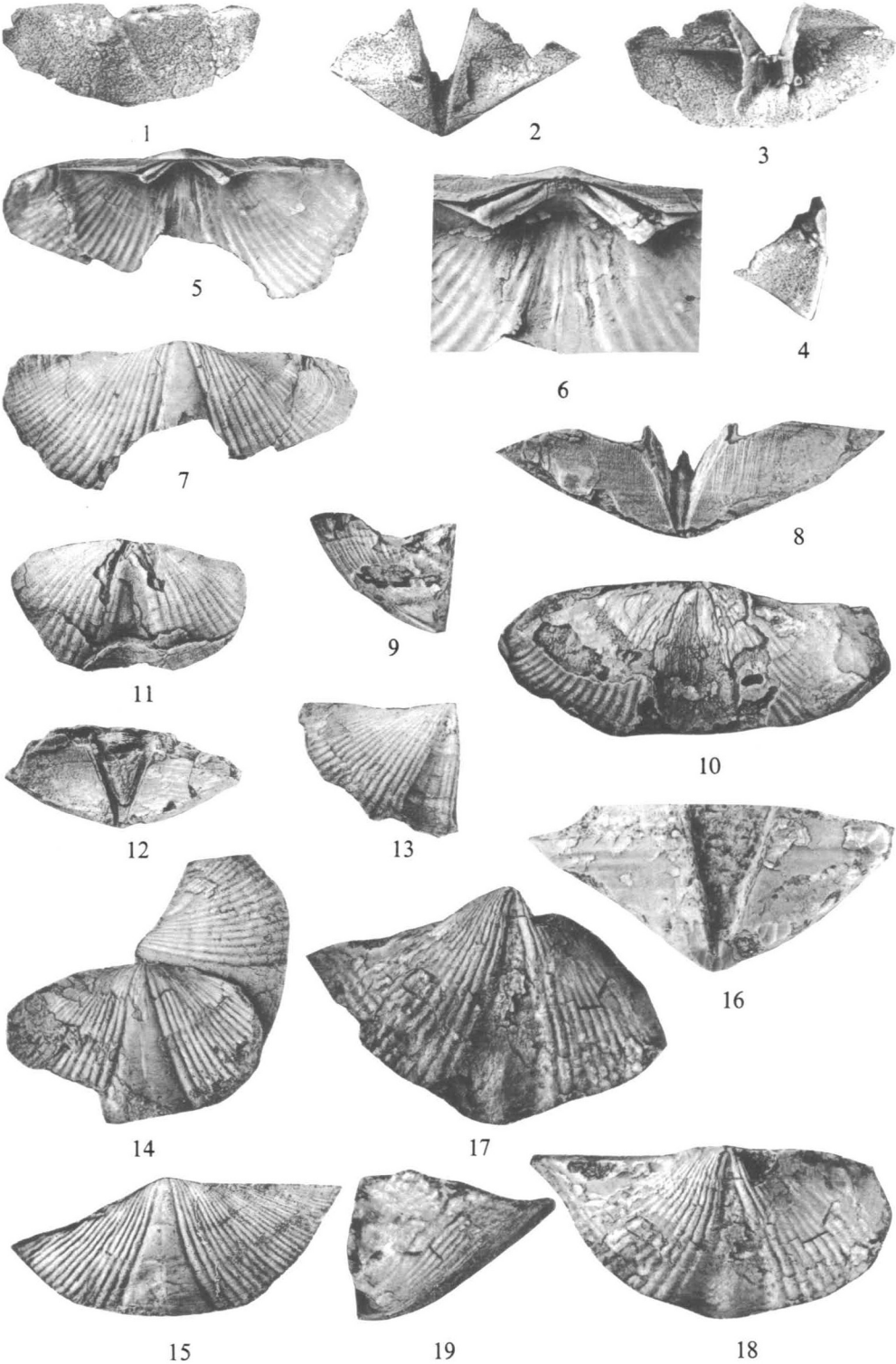
## PLATE 55

### *Syringothyris langfieldensis* sp. nov.

(Figures 1-19 from the Septimus Limestone.  $\times 1$  unless otherwise indicated.)

#### Figures

- 1-4. Ventral, posterior, internal, and lateral views of a silicified pedicle valve. Note the sunken delthyrial plate bearing a channel-like syrx. CPC 11044; locality 104/11, Mount Septimus.
- 5-7. Internal and external views of a silicified brachial valve. Fig. 6 is an enlargement ( $\times 2$ ) showing the apical structures. CPC 11045; locality 138/2, Burt Range Amphitheatre.
- 8-10. Posterior, lateral, and ventral views of a partly silicified pedicle valve. CPC 11046; locality 112/2, Langfield Point.
- 11, 12. Ventral and posterior views of a silicified pedicle valve showing the lamellose plate covering the delthyrium. CPC 11047; locality 112/2.
13. Silicified pedicle valve exterior. Note the narrow groove on the costae bordering the sinus. CPC 11048; locality 112/2.
14. Two brachial valve exteriors. CPC 11049, paratypes; locality 110/5, Mount Zimmermann.
15. Rubber cast of a brachial valve exterior. CPC 11050; locality 110/6, Mount Zimmermann.
- 16-19. Posterior, ventral, and lateral views of a pedicle valve. CPC 11051, holotype; locality 110/5.



## PLATE 56

### *Crassumbo? jonesi* sp. nov.

(Figures 1-15 from locality 7/1 (Tournaisian part), Ningbing Limestone, Ningbing Range.)

#### Figures

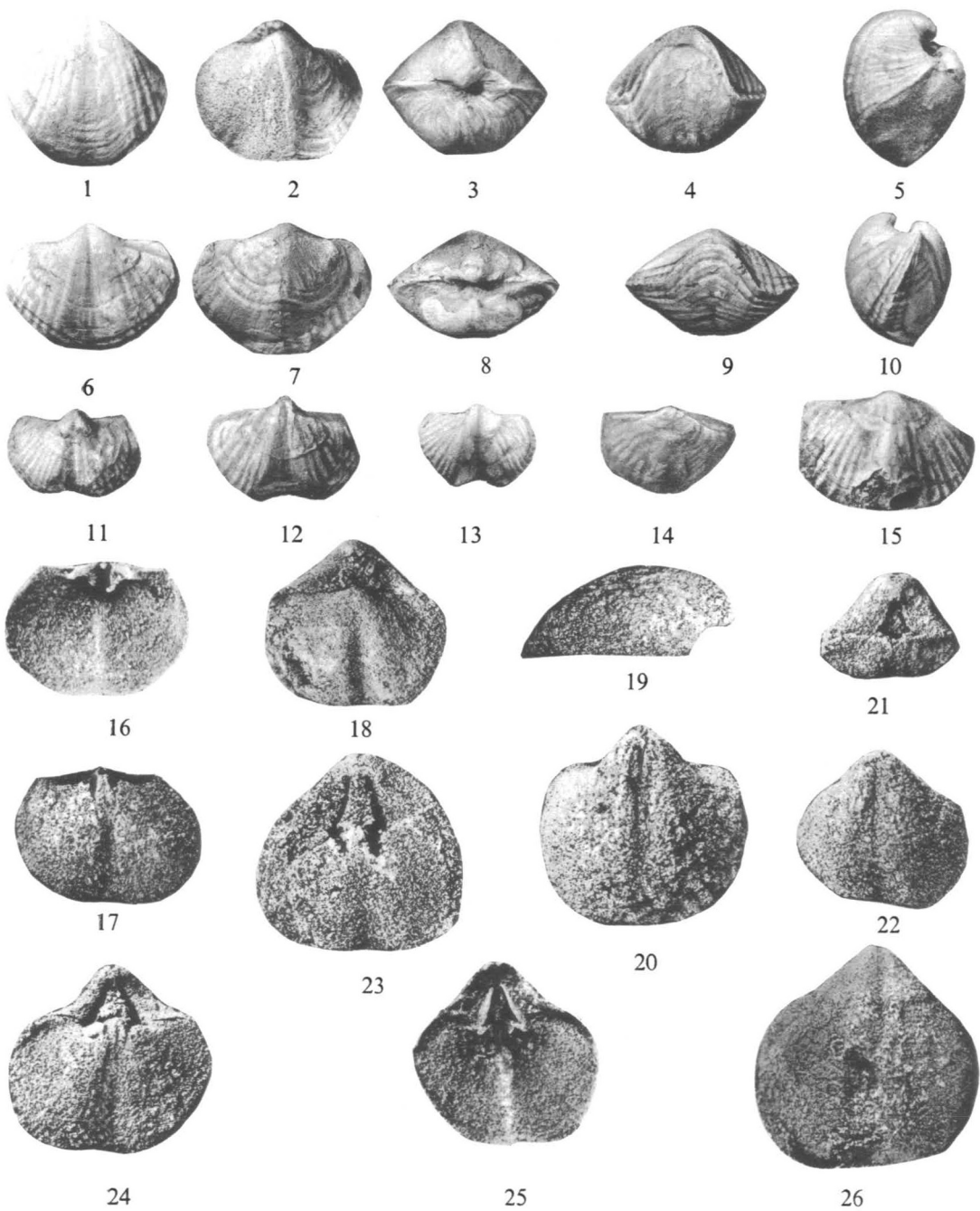
- 1-5. Ventral, dorsal, posterior, anterior, and lateral views of a paratype. CPC 8254;  $\times 1.5$ .
- 6-10. Ventral, dorsal, posterior, anterior, and lateral views of the holotype. Note the smooth umbo, and the obsolete costae on the anterior two-thirds of the lateral slopes. CPC 8255;  $\times 1.5$ .
11. Rubber cast of a pedicle valve exterior. CPC 8256, paratype;  $\times 1.5$ .
12. Pedicle valve exterior. CPC 8258, paratype;  $\times 1$ .
13. Pedicle valve exterior. CPC 8257, paratype;  $\times 1$ .
14. Brachial valve exterior. CPC 8259, paratype;  $\times 1$ .
15. Brachial valve exterior. CPC 8260, paratype;  $\times 1.5$ .

### *Crurithyris apena* Veevers

(Figures 16-26 from locality 28/10, Kununurra Member of the Cockatoo Formation, Matheson Ridge.  $\times 4$ .)

#### Figures

- 16, 17. Rubber cast and internal mould of a brachial valve interior. Note the peg-like cardinal process, and the crural plates. CPC 8261.
18. Dorsal view of a rubber cast showing the dorsal median sinus, and the ventral interarea. CPC 8262.
- 19, 20. Lateral and ventral views of an internal mould of a pedicle valve. CPC 8263.
21. Rubber cast of the posterior of a shell showing the high ventral interarea, and the delthyrium. CPC 8265.
22. Internal mould of a pedicle valve. CPC 8264.
23. Internal mould in dorsal view showing the crural plates in the brachial valve, and the dental plates in the pedicle valve. CPC 8266.
- 24, 25. Dorsal views of an internal mould and a rubber cast showing the cardinalia. Note the narrow median ridge at the posterior of the brachial valve in Fig. 24. CPC 8267.
26. Rubber cast of a pedicle valve exterior. CPC 8268.





## PLATE 57

### *Kitakamithyris occidua* sp. nov.

(Figures 1-11 and 13-24 are all  $\times 1$ ; Figure 12 is  $\times 1.5$ .)

#### Figures

- 1-4. Ventral, dorsal, posterior, and lateral views of a partially decorticated shell. CPC 8509, holotype; locality 7/1, Ningbing Limestone (Tournaisian part), Ningbing Range.
- 5-9. Ventral, dorsal, posterior, anterior, and lateral views of a partially decorticated shell. CPC 8510, paratype; locality 7/1.
10. Brachial valve exterior showing the low fold and the lamellose ornament. CPC 8511, paratype; locality 7/1.
11. Decorticated brachial valve. Note the very weak fold. CPC 8512; locality 7/1.
12. Decorticated brachial valve showing radial striations in the shell material. CPC 8513, paratype; locality 7/1.
13. Decorticated brachial valve. Note the striations within the shell. CPC 8514; locality 7/1.
14. Rubber cast of a brachial valve exterior. CPC 8515; locality 7/1.
15. Rubber cast of a pedicle valve exterior showing traces of the spinose ornament on well-defined concentric lamellae. CPC 8516, paratype; locality 7/1.
16. Internal mould of a pedicle valve showing the median septum, the ventral adminicula, the muscle field, and the mantle canals. CPC 8517, paratype; locality 7/1.
17. Brachial valve exterior. CPC 8518; locality 102/4, Enga Sandstone, northern end of Enga Ridge.
18. Pedicle valve exterior. CPC 8519; locality 100/21, Burt Range Formation. 6.5 miles northwest of Mount Septimus.
19. An internal mould of a pedicle valve. Note the low median septum, the ventral adminicula, and the muscle field. CPC 8520; locality 117/1, Burt Range Formation, Spirit Hill.
20. Internal mould of a pedicle valve showing the striated diductor muscle scars. CPC 8521; locality 117/1.
- 21-24. Ventral, dorsal, lateral, and posterior views of a distorted shell. Note the fine spine bases on Fig. 21. CPC 8522; locality 102/4.



1



2



3



4



5



6



7



8



9



10



11



12



13



14



15



16



17



18



19



20



21



22



23



24

## PLATE 58

### *Punctospirifer plicatosulcatus* Glenister

(Figures 1-12 from locality 109/8, Enga Sandstone, middle part of Enga Ridge.)

#### Figures

- 1-8. Ventral, dorsal, posterior, and anterior views of two specimens. CPC 11052 and CPC 11053, respectively; both  $\times 2$ .
- 9-12. Ventral, dorsal, posterior, and lateral views of CPC 11054.  $\times 1$ .
13. Silicified pedicle valve interior having the median septum almost buried by apical callus. CPC 11055; locality 129/4, Burt Range Formation, southern end of Enga Ridge;  $\times 2$ .
14. Interior of an unthickened pedicle valve. CPC 11056; locality 128/6, Burt Range Formation, middle part of Enga Ridge;  $\times 2$ .
15. Silicified brachial valve interior. CPC 11057; locality 128/6, Burt Range Formation, middle part of Enga Ridge;  $\times 4$ .
16. Silicified brachial valve interior. CPC 11058; locality 102/4, Enga Sandstone, northern part of Enga Ridge;  $\times 2$ .

### *Punctospirifer pauciplicatus* sp. nov.

(Figures 17-29 from locality 108/0, Utting Calcarenite, Utting Gap,  $\times 2$ , and Figure 30 from locality 108/3, Utting Calcarenite, Utting Gap,  $\times 6$ .)

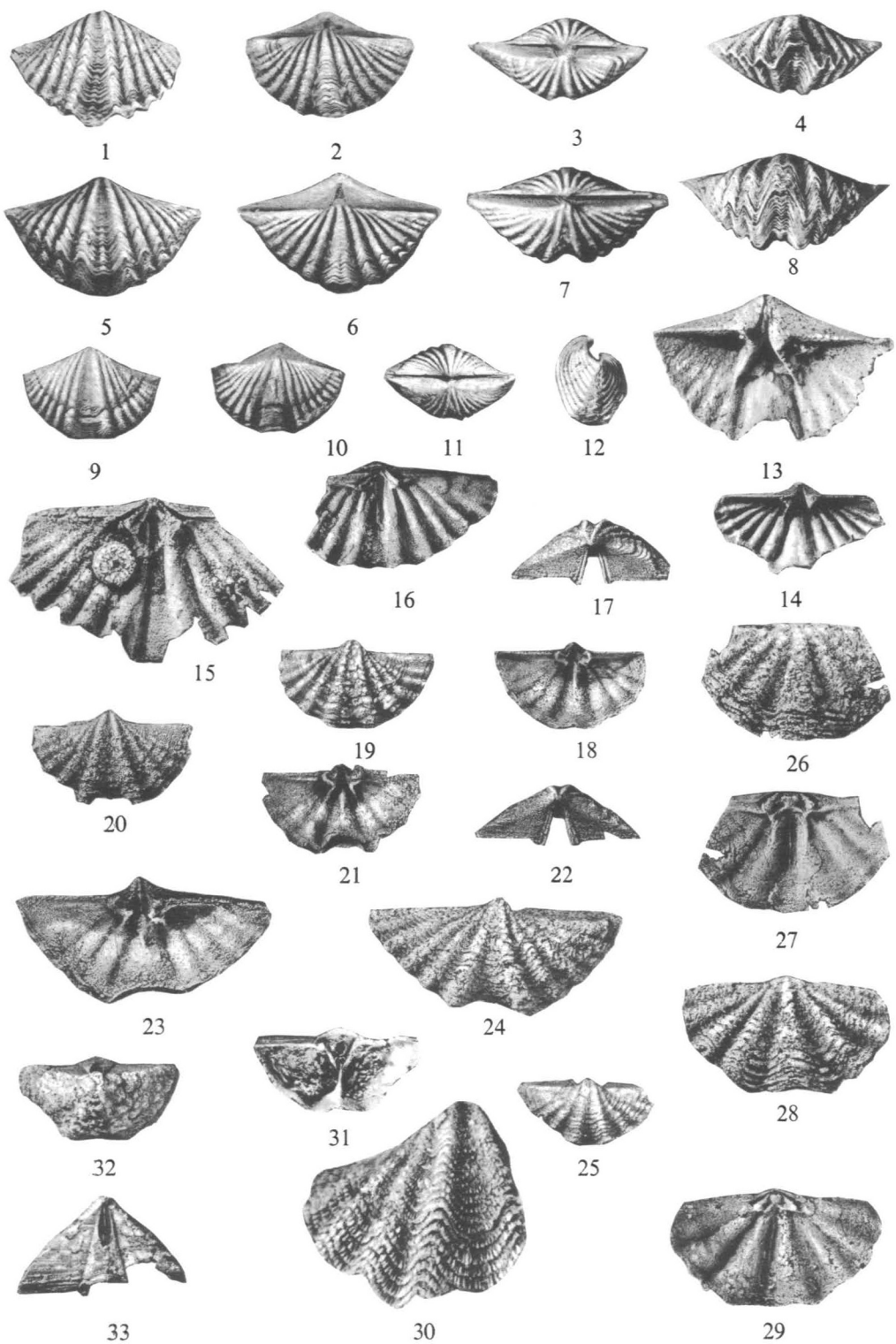
#### Figures

- 17-19. Posterior, interior, and exterior views of a silicified pedicle valve. Note the high median septum and short ventral adminicula. CPC 11059, paratype.
- 20-22. Exterior, interior, and posterior views of a silicified pedicle valve. CPC 11060, paratype.
- 23, 24. Internal and external views of a silicified pedicle valve. CPC 11061, holotype.
25. External view of a silicified pedicle valve. CPC 11062, paratype.
- 26, 27. External and internal views of a silicified brachial valve. Note the thickening at the front of the cardinal process, and the flange-like crura. CPC 11063, paratype.
- 28, 29. External and internal views of a silicified brachial valve. CPC 11064, paratype.
30. Close-up of part of a pedicle valve showing the spinose micro-ornament. CPC 11065.

### *Cyrtina* sp.

#### Figures

- 31-33. Interior, ventral, and posterior views of a silicified pedicle valve. Note the narrow spondylium bearing a tichorhinum in the interior of the valve. CPC 11066; locality 108/3, Utting Calcarenite, Utting Gap;  $\times 2$ .



## PLATE 59

### *Girtyella acymosa* sp. nov.

(Figures 1-18 from the Utting Calcareenite, Utting Gap. Figures 1-15 are from locality 108/3, and Figures 16-18 are from locality 108/0.  $\times 2$  unless otherwise indicated.)

#### Figures

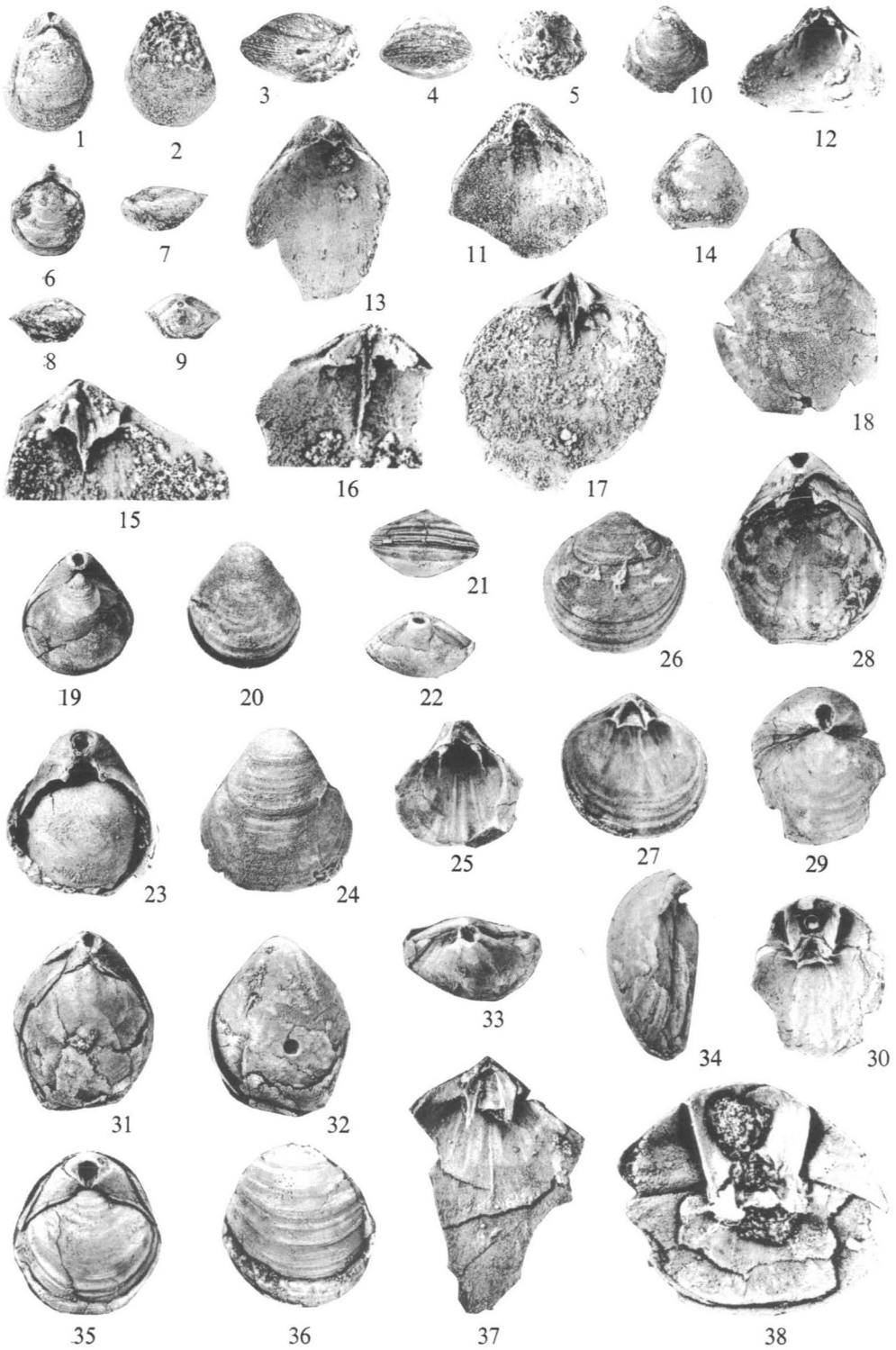
- 1-5. Dorsal, ventral, lateral, anterior, and posterior views of the holotype. Note the swollen brachial valve. CPC 11067.
- 6-9. Dorsal, lateral, anterior, and posterior views of paratype. CPC 11068.
- 10, 11. Exterior and interior of a silicified pedicle valve. CPC 11069, paratype; Fig. 11  $\times 4$ .
- 12, 13. Pedicle valve interior viewed anteriorly and dorsally. Note the short dental plates in Fig. 11. CPC 11070, paratype;  $\times 4$ .
14. Pedicle valve exterior having a broken anterior margin. CPC 11071, paratype.
15. Internal view of the posterior of a brachial valve showing the concave cardinal plate, and median septum. CPC 11072, paratype;  $\times 6$ .
16. Apical part of a brachial valve interior. CPC 11073;  $\times 6$ .
17. Silicified brachial valve interior. CPC 11074;  $\times 4$ .
18. Large pedicle valve exterior. CPC 11075.

### *Cranaena montana* sp. nov.

(Figures 19-27 from locality 150/4, Septimus Limestone, southwestern end of Mount Septimus, and Figures 28-38 from locality 102/4, Enga Sandstone, northern end of Enga Ridge.  $\times 2$  unless otherwise indicated.)

#### Figures

- 19-22. Dorsal, ventral, anterior, and posterior views of a silicified specimen. CPC 11076.
- 23, 24. Dorsal and ventral views of a disarticulated specimen showing the pedicle collar. CPC 11077.
25. Pedicle valve interior showing the dental plates, median ridge, and mantle canals. CPC 11078.
- 26, 27. External and internal views of a brachial valve. Note the mantle canals and apical structures in Fig. 24. CPC 11079.
28. Pedicle valve interior. CPC 11080, paratype.
- 29, 30. External and internal views of the apical parts of a silicified specimen. The internal view shows the pedicle collar, dental plates, socket ridges, and the perforate cardinal plate. CPC 11081, paratype.
- 31-34. Dorsal, ventral, posterior, and lateral views of the holotype. CPC 11082.
- 35, 36. Dorsal and ventral views of paratype CPC 11083.
37. Broken brachial valve interior showing the apical structures. CPC 11084, paratype;  $\times 3$ .
38. Apical parts of a silicified specimen. CPC 11085, paratype;  $\times 4$ .



## INDEX TO FOSSIL AND STRATIGRAPHIC NAMES

- Abney Member, 6, 13, 23, 28  
*abruptus*, *Schistochonetes*, 20, 21, 55, 57  
*Acanthocosta*, 33, 104  
     *teichertii*, 15, 24, 29, 104, 106, 107  
     *teichertii* zone, 15, 24, 29  
*Actinoconchus*, 187  
*aculeata*, *Avonia*, 100  
*acuminatus*, *Pugnax*, 37, 152  
*Acuminothyris*, 33  
*acutiplicata*, *Nayunnella*, 162  
*acutirugata*, *Camarotoechia*, 134, 139  
*acutirugatum*, 18, 136, 141  
     *Septemirostellum*? 17, 18, 36, 136, 141  
*acutisimilis*, *Podtsheremia*, 219  
*acymosa*, *Girtyella*, 272, 273  
*adamantinus*, *Rossirhynchus*, 133  
*adunata*, *Spinocarinifera*, 14, 15, 35, 36, 101, 103, 118  
*adunata* zone, 14  
*ajugata*, *Desquamatia Variatrypa*, 166  
*albertensis*, *Atrypa*, 175  
*Alispirifer*, 33  
*alternatus*, *Echinoconchus*, 123  
*alcostata*, *Litothyris*, 14, 238  
*amatus*, *Retichonetes*, 69, 71  
*amblys*, *Punctospirifer*, 27  
*Amesopleura*, 207, 228  
     *texana*, 229  
*amnicum*, *Septemirostellum*, 17, 18, 30, 32, 35, 36, 133, 134, 137, 138, 139, 144, 151  
*Amnicum* zone, 15, 16, 17, 18, 26, 30, 207  
*Amphipora ramosa* zone, 12  
*analoga* *Leptagonia*, 15, 19, 26, 32, 35, 36, 37  
*Anatrypa*, 166  
     *micans*, 166, 167  
*angulata*,  
     *Nix*, 58  
     *Rugosochonetes*, 62  
     *Syringothyris*, 248  
*anterosa*, *Voiseyella*, 228, 229  
*Anthraconeilo*, 27  
*Anthracospirifer*, 33, 215, 217, 220  
     *birdspringensis*, 220  
     *bisulcatus*, 21  
     *curvilateralis*, 220, 224  
     *milliganensis*, 20, 27, 36, 37  
     *milliganensis* zonal assemblage, 10, 20  
     *milliganensis* zone, 20, 21, 27  
     sp. cf. *A. milliganensis*, 27  
     *missouriensis*, 220  
     *shoshonensis*, 21, 37, 220, 223  
*Antiquatonia*, 33  
     *muricatus*, 117  
*apena*, *Crurithyris*, 12, 13, 23, 263, 264  
*apena* zone, 13, 264  
*applingtonensis*, *Productella*, 84  
*aquila*, 88  
     *Lomatiphora*, 15, 16, 24, 86, 87, 94, 110  
*aquila* zone, 15, 16, 17, 24, 25, 26, 207  
*arcuata*, *Spinocarinifera*? 35, 15, 103  
     *arcuatus*, *Productus*, 101  
*arenarius*, *Retichonetes*, 13, 69, 71, 72  
*arenatus*,  
     *Ectochoiristites*, 233  
     *Ectochoiristites*? 25  
*Argentiproductus*, 94  
     *margaritaceus*, 94  
*artyshtensis*, *Stegacanthia sibirica*, 119  
*asiaticus*, *Pugnax*, 37  
*aspera*, *Spinatrypa*, 174, 175  
*aspinosa*, *Delepineia*, 75, 76, 78, 79  
*Asyrinxia*, 33, 249  
*Athyridinae*, 178  
*Athyris*, 33, 187  
     *ingens*, 186  
     *ornata*, 186  
     *parvirostra*, 183  
     cf. *protea* var. *globularis*, 180  
*Atribonium*, *pauperum*, 165  
*Atrypa*, 167  
     *aspera prideri*, 174  
     *bodini*, 175  
     *desquamata*, 167, 170  
     *desquamata kimberleyensis*, 166, 167, 170  
     *multimoda*, 170  
     *parva*, 170, 174  
     *spinosa*, 176  
     cf. *albertensis*, 175  
*attenuatus*, *Spirifer*, 19, 20, 35  
*auriculus*, *Rugosochonetes*, 66  
*australe*, *Rugaltarostrium*, 13, 14, 157, 158, 159, 160  
*australis*, 18  
     *Orthotetes*, 22  
     *Schellwienella*, 18, 19, 35  
     *Syringothyris*, 253  
*australis* zone, 17, 18, 19  
*Austrochoiristites*, 33, 230  
     *levisulcatus*, 16, 17, 24, 25, 26, 231, 233  
*Avon Gorge*, 18, 19, 101, 103, 106, 134, 136, 141  
*Avonia*, 100, 101  
     *aculeata*, 100  
     *inflata*, 101  
     *proteus*, 103  
     *quasiavonia*, 100  
     *semicostata*, 101  
     *youngiana*, 100  
     cf. *niger*, 36  
*Babbinoon*, 229  
*baitalensis*, *Camarotoechia*, 149  
*Balanoconcha*, 33  
*Bankcroft Formation*, 17  
*bassa*, *Spinocarinifera*? 103  
*bassus*, ? *Productus*, 101  
*bedfordensis*, *Syringothyris*, 251  
*Bedford Formation*, 251  
*beedi*, *Protoniella*, 115  
*Belgium*, 15  
*bifida*, *Syringothyris*, 248  
*biplex*,  
     *Camarotoechia*, 134  
     *Septemirostellum*, 36, 136, 141

- biplicoides*, *Spirifer*, 207  
*birdspringensis*, *Anthracospirifer*, 220  
*bisbeensis*, *Brachythyris*, 237  
*biseriata*, *Stegacanthia*, 124  
*biseriatus*, *Echinoconchus*, 36, 123, 124  
*bisulcata*, *Cardiothyris*, 15, 178, 180  
*bisulcatus*,  
     *Anthracospirifer*, 21  
     *Spirifer*, 36  
*blairi*, *Rhytiophora*, 98  
*bodoni*, *Atrypa*, 175  
 Bonaparte  
     Beds, 6, 27, 42  
     Gulf Basin, 88, 91, 99, 110, 124, 129,  
         135, 138, 140, 146, 148, 151,  
         165, 167, 170, 186, 187, 211,  
         217, 243, 262, 267, 269, 270  
     No. 1 Well, 8, 21, 22, 27  
*bonapartensis*, *Composita*, 18, 19, 27  
*boonensis*, *Pugnoides*, 153, 155  
 Border Creek Formation, 8, 19  
 Boulonnais, 13, 171  
*bowsheri*, *Stegacanthia*, 119  
*Brachythyridinae*, 237  
*Brachythyris*, 237, 239, 243  
     *bisbeensis*, 237  
     *chouteauensis*, 15, 243  
     *krapivnensis*, 243  
     *laticardinalis*, 19, 243  
     *peculiaris*, 19  
     *planulata*, 15, 241, 243, 244  
     *putilla*, 237  
     sp. cf. *B. peculiaris*, 19, 22, 35, 244  
 Brazer Limestone, 273  
*Buchiola*, 28  
 Buckets Gap, 228  
 Bugle,  
     Gap, 12, 28  
     Limestone, 14, 150  
*burlingtonensis*,  
     *Marginatia*, 122  
     *Schellwienella*, 19, 35  
 Burlington  
     Formation, 134, 215  
     Limestone, 18, 19, 35, 122, 148, 153,  
         229, 271  
*burnettensis*, *Prospira*, 207  
 Burt Range  
     Amphitheatre, 24, 25, 26  
     Formation, 7, 8, 14, 15, 16, 17, 19, 25,  
         29, 30, 42, 91, 107, 110, 118,  
         134, 135, 138, 140, 148, 151,  
         182, 186, 207, 211, 233, 253,  
         259, 269, 272  
 Burvill  
     Beds, 8, 21, 22, 27, 37, 42, 69, 74,  
         78, 80, 217, 222, 223  
     Point, 27, 69, 120  
*burvillensis*, *Globosochonetes*, 21, 72, 73,  
     74  
*buttonensis*, *Leioproductus*, 14, 89, 90, 91,  
     114  
 Buttons  
     Beds, 6, 13, 14, 24, 91, 114  
     Crossing, 91, 194  
     *cacuda*, *Orthis*, 46  
     *Caenanoplia*, 72  
     *calhounensis*, *Rhytiophora*, 15, 35, 98, 99  
     *calva kosharica*, *Productella*, 83  
     *Calvinaria*, 158  
     *Calvinaria?* 13  
     *Camarophoria*  
         *?isorhyncha*, 148  
         *moshihlingensis*, 36, 139  
     *Camarotoechiinae*, 157  
     *Camarotoechia*  
         *acutirugata*, 134, 139  
         *baitalensis*, 149  
         *biplex*, 134  
         *chouteauensis*, 134  
         *inequa*, 134  
         *kinglingensis*, 36, 139  
         *metallica*, 134  
         *mitchelleanensis*, 134  
         *pleurodon*, 148  
         *septima*, 25, 140  
         *sobrina*, 14, 35, 151  
         *subglobosa*, 148  
         *tidwellae*, 134  
         *tuta*, 134  
         sp. cf. *C. lucida*, 138, 151  
     Cameron Creek Formation, 220, 270  
     Canindah Creek, 17, 205  
     Canning Basin, 28, 30, 83, 88, 103, 148,  
         150, 156, 162, 167, 170,  
         174, 175, 211, 264  
     Carboniferous Limestone, 224  
     *Cardiothyris*, 33, 178  
         *bisulcata*, 15, 178, 180  
     *carinata*, *Delepineia*, 20, 36, 76, 79  
     *carinatus*, *Spirifer*, 215  
     Carlton  
         Hill, 207  
         Track, 182  
     Carnarvon Basin, 18, 28, 32, 83, 138, 174,  
         186, 253, 260, 269  
     *carnarvonensis*, *Composita*, 30  
     Cecil  
         Member, 12  
         Sandstone member, 6  
     *celticus*, *Rugosochonetes*, 21, 36, 64  
     *Centrospirifer*, 188  
     Cerro Gordo Member, 13, 175  
     *chappelensis*, *Spirifer*, 15, 212  
     Chappel Limestone, 15, 18, 35, 215, 229,  
         243, 248, 256, 272  
     *chemungensis*, *Syringothyris*, 19, 253  
     Chester, 20, 180, 183  
     Chinese faunas, 36  
     *Chitralensis*, 176  
     *Chonetes*  
         *gloucesterensis*, 68  
         *papilionacea*, 80  
     *Chonetidid*, 81  
     *Chonopectinae*, 88  
     *Choristites*, 230, 234, 237  
     Choniukou Formation, 125  
     *chouteauensis*,  
         *Brachythyris*, 15, 243  
         *Camarotoechia*, 134



- Septemirostellum*, 35, 136  
 Chouteau Formation  
   of Mississippi Valley, 106  
   of Missouri, 134, 220  
 Chouteau Limestone  
   of Mississippi Valley, 19  
   of Missouri, 15, 18, 35, 215, 248, 271  
*ciliipes*, *Desquamatia*, 13, 171  
*?Cleiothyridina*, 187, 188  
*Cleiothyridina?* 21, 26, 27  
   *fitzroyensis*, 30  
*Cleiothyridina*, 182, 183, 187  
   *glabistria*, 186  
   *gloveri*, 14, 17, 24, 25, 29, 180, 182, 183  
   *minilya*, 19, 29, 30, 35, 36, 183, 185,  
     186, 187  
   *obmaxima*, 35, 36, 186, 188  
   *sublamellosa*, 183  
 Cockatoo Formation, 6, 12, 13, 28, 30, 88,  
   167, 174, 200, 201,  
   264  
*Coledium*, 165  
*Coledium?* 164  
*columnaris*, *Tenticospirifer*, 13, 23, 34, 198,  
   200, 201, 202  
*Composita*, 22, 26, 178  
   *bonapartensis*, 18, 19, 27  
   *carnarvonensis* 30  
   *hendersoni*, 30  
   *laevis*, 180  
*concava*, *Cranaena*, 272  
*concentrica*, *Schuchertella*, 14, 29  
 Conewango Formation, 248  
*costata*, *Eomartiniopsis*, 17, 18, 26, 244, 247,  
   248  
*Craneana*, 270, 272  
   *concava*, 272  
   *globosa*, 18, 271  
   *montana*, 17, 18  
   *occidentalis*, 271  
   *romingeri*, 270, 271  
   *texana*, 272  
*crassistrius*, *Plicochonetes*, 57  
*Crassumbo*, 255, 257  
   *inornatus*, 15, 255, 256  
   *?jonesi*, 15, 254, 255, 256, 257  
   *turgidus* 15, 256  
   *voiseyi*, 257  
*crenistria*, *Schellwienella*, 19  
*cristata*,  
   *Spinauris*, 19, 108, 109, 112  
   *?Spinauris*, 16, 26, 30  
*Crurithyris*, 33  
   *apena*, 12, 13, 23, 263, 264  
   *apena* zone 9, 12, 23, 28  
   *inflata*, 264  
   *urei*, 264  
*Cupularostrum*, 133  
*curvilateralis*, *Anthracospirifer*, 220  
*cuspidata*,  
   *Syringothyris*, 248, 250  
   *Tenticospirifer aperturata*, 201  
*Cyrtina*, 26, 33, 264  
*cyrtinaformis* *Tenticospirifer*, 13, 201, 202  
*Cyrtospirifer*, 13, 188, 193, 196, 197, 208,  
   217, 249  
   *calcaratus magnus*, 194  
   *depressus*, 14, 35, 194, 196, 197  
   fauna, 32  
   *gneudnaensis*, 32  
   *kemeroensis*, 14, 197  
   *monticolaformis*, 193  
   *ningbingensis*, 14, 35, 188, 190, 192, 193,  
     194, 197  
   *ningbingensis* zone, 13, 23  
   *pamiricus pamiricus*, 193  
   *pamiricus paralis*, 35, 193  
   *schelonius*, 193  
   *stolbovi*, 201  
   *verneuili* var. *gosseleti*, 194  
   *whitneyi*, 35, 194  
   *ziganensis*, 14, 197  
 C Zone, 18, 19, 136, 141, 228, 253  
*Daviesiella*, 75  
*Delepinea*, 75, 76, 78, 79  
   *aspinosa*, 75, 76  
   *aspinosa* zone, 22  
   *carinata*, 20, 36, 76, 79  
   *destinezi*, 20, 36, 75, 76, 78, 79  
   *gloucesterensis*, 76  
   *uttingi*, 20, 36, 75, 76, 78, 79  
*Delepinea*inae, 75  
*delicatus*, *Rugosochonetes*, 64  
*Delthyris novamexicana*, 207  
*deltidialis*, *Ptychomaletoechia?* 149, 151  
*demini*, *Rugosochonetes*, 61  
*depressus*, *Cyrtospirifer*, 14, 35, 194, 196,  
   197  
*deruptoides*, *Marginatia*, 18, 36, 122  
*desquamata*, *Atrypa*, 167, 170  
*Desquamatia*, 165, 166, 167, 170, 171  
   *agugata*, 166  
   *ciliipes*, 13, 171  
   *(?Desquamatia) schroeteri*, 171  
   *khavae*, 166  
   *magna*, 166  
   *prisca gladbachensis*, 171  
   *(Seratrypa) pectinata*, 166  
   *subzonata*, 166  
   *(Synatrypa)*, 165, 167, 170, 171  
   *(Synatrypa) kimberleyensis*, 12, 13, 34,  
     166, 168,  
     170, 171  
   *(Synatrypa) subzonata*, 170  
   *(Variatrypa) zonata*, 166  
   *Zonataeformis*, 13, 170  
*destinezi*, *Delepinea*, 20, 36, 75, 76, 78, 79  
 Devonian-Carboniferous boundary, 8  
*devonica*, *Schuchertella*, 48  
*Dictyoclostinae*, 125  
*Dictyoclostus*, 125  
   *?funiferus*, 20, 21, 27, 126, 127  
   *semireticulatus*, 125, 127  
*distans*, *Syringothyris*, 248, 251  
*divaricata*, *Rhipidomella michelini*, 42  
*dominus*, *Eochonetes*, 55  
 Donetz Basin, 36  
*dorsiplana*, *Schuchertella*, 16, 17, 25, 29, 30,  
   44, 45, 46  
   *dorsiseptatus*,  
   *Torynifer*, 262

- Torynifer*? 18, 19, 36, 260  
 Dorsoscyphinae, 49  
*Dorsoscyphus*, 33, 50  
     *spinulosus*, 20, 21, 50  
*dorsosinuata*, *Schizophoria resupinata*, 40, 41  
*douvillei*, *Retichonetes*, 71  
*dromeda*, *Schuchertella*, 44, 48  
*duplicostatus*, *Spirifer*, 21, 36, 219, 220, 223  
 D Zone, 18, 228  
 D2 Zone, 19, 253  
  
 Echinoconchinae, 123  
*Echinoconchus*, 123  
     *alternatus*, 123  
     *biseriatus*, 36, 123, 124  
     *elegans*, 33, 36, 37, 123, 124, 125  
     *eximius*, 123  
     *gradatus*, 22, 27, 36, 37, 123, 124, 125  
     *gradatus fauna*, 22, 33  
     *karavankina*, 123  
     *punctatus*, 123  
     *subelegans*, 123  
     *venustus*, 123  
     *vittatus*, 125  
*Ectochoistites*, 230  
     *arenatus*, 233  
     ? *arenatus*, 25  
     *arenatus* var. *latus*, 233  
*eganensis*, *Grammorhynchus*, 17, 29, 30, 32, 133, 146, 148  
*eganensis* zone, 17, 18, 25, 26, 30  
 Egan's Bore, 148  
     Eifelian, 175  
     Freilingen Beds, 175  
*elburzensis*, *Ptychomaletoechia*, 149  
*elegans*, *Echinoconchus*, 33, 36, 37, 123, 124, 125  
*elongata*,  
     *Eomartiniopsis*, 247  
     *Ovatia*, 128  
     *Syringothyris*, 19, 253  
 Elythridid, 27  
 Enga  
     Ridge, 17, 24, 25, 110, 148, 272  
     Sandstone, 8, 17, 25, 26, 30, 42, 91, 134, 138, 151, 186, 207, 224, 226, 259, 269  
*Eochoristites*, 237  
*Eomarginifera*, 33  
*Eomartiniopsis*, 33, 244  
     *costata*, 17, 18, 26, 244, 247  
     *elongata*, 247  
     *girtyi*, 18, 247, 248  
     *tscherepeti*, 248  
*Eoplicanoplia*, 72  
*ericsoni*, *Nayunnella*, 162  
*erugatus*, *Pugnoides*, 14, 156, 157  
*Etroeungti*, 14, 93, 101, 197  
*Eumetria*, 33  
*eximius*, *Echinoconchus*, 123  
  
 Fairfield Formation, 14, 28, 29, 150  
 Fairy Bower Beds, 205  
 Famennian, 6, 13, 23, 24, 28, 29, 34, 35, 83, 93, 97, 151, 153, 162, 193, 237  
     Applington Formation, 84  
     Ouray Limestone, 194  
     Percha Shale, 237  
 Famennian Zone, 103  
*fasciculata*, *Tangshanella*? 19, 234, 235  
*Fenestella* Beds, 251  
*fernflenensis*, *Marginatia*, 122  
 Fern Glen Formation, 35, 153, 155, 186, 188  
*fimbriata*, *Overtonia*, 85  
*fitzroyensis*, *Cleiothyridina*? 30  
*flexuosa*, *Ningbingella*, 15, 152, 153, 155, 156  
*Fluctuaria*, 33  
*fluctuosus*, *Unispirifer*, 29, 30  
*fontanalis*, *Syringothyris*, 21, 248, 249, 250, 251,  
*fragaria*, 84  
 Frasnian, 6, 12, 13, 28, 29, 30, 34, 71, 84, 165, 166, 170, 175, 201, 264  
     Cockatoo Formation, 23  
     Limestone, 28  
     Macgea fauna, 175  
     Sadler Formation, 88, 156  
     Svinard Beds, 201  
     *torrida* zone, 175  
     Voroneje Beds, 83  
     Westwood Member, 88  
*funiferus*, *Dictyoclostus*? 20, 21, 27, 126, 127  
*Fusella*, 203, 208, 211, 217  
     *llanoensis*, 208  
     *ussiensis*, 16, 211  
*fusiformis*, *Spirifer*, 208  
  
*Gattendorfia* zone, 8, 9  
 Geikie Formation, 14, 150  
*gibbosum*, *Rugaltarostrium*, 160  
 Gigantoproductinae, 129  
 Gigantoproductinid, 129  
*Gigantoproductus*, 33  
*Girtyella*, 273  
     *acymosa*, 272, 273  
     *injensis*, 273  
     *wellsvillensis*, 273  
     *woodworthi*, 273  
*girtyi*, *Eomartiniopsis*, 18, 247, 248  
 Givetian, 30  
*glabistria*, *Cleiothyridina*, 186  
*gladbachensis*, *Desquamatia prisca*, 171  
*globosa*, *Cranaena*, 18, 271  
*Globosochonetes*, 33, 36, 72, 74  
     *burvillensis*, 21, 73, 74  
     ? *mathesonensis*, 13, 74  
     *parseptum*, 73,  
*globularis protea*, *Athyris*, 180  
*gloucesterensis*,  
     *Chonetes*, 68  
     *Delepinea*, 76  
     *Rugosochonetes*, 68  
*gloveri*, *Cleiothyridina*, 14, 17, 24, 25, 29, 180, 182, 183  
*gneudnaensis*, *Cyrtospirifer*, 32  
 Gneuda Formation, 30, 83, 174  
*gosseleti*, *Cyrtospirifer*, *verneuili*, 194  
*gradatus*,  
     *Echinoconchus*, 22, 27, 36, 37, 123, 124, 125

- fauna, 22  
*Productus*, 125  
*Grammorhynchus*, 33, 144, 145, 146  
   *eganensis*, 17, 29, 30, 32, 133, 146, 148  
   *eganensis* zone, 17, 25, 29  
*gratillica*, *Schuchertella*, 13, 44, 47, 48  
*greenleighensis*, *Pleuropugnoides*, 146  
 Grumbler Formation, 13  
*gueizhouensis*, *Schuchertella*, 45  
  
 Hackberry Formation, 194  
*hannibalensis*, *Syringothyris*, 250, 251  
*hardrensis*, *Rugosochonetes*, 58, 64, 69  
 Hargreaves  
   Hills, 84, 202  
   Member, 6, 12, 13, 23, 28, 201  
*haydenianus*, *Spirifer*, 37, 216  
 Heath Formation, 220  
*hendersoni*, *Composita*, 30  
*herminae*, *Productella*, 83  
 Hookhead, 224  
*hsikuangshanensis*, *Tenticospirifer*, 202  
*humilicostata*, *Podtsheremia*? 20, 21, 36, 37,  
   217, 219, 220,  
   222, 223  
  
*Hunanospirifer*, 188  
*Hustedia*, 176, 177  
   *aff. radialis*, 177  
   *mormoni*, 177  
   *paula*, 176, 177  
   *pygmaea*, 177  
   *radialis*, 177  
   *cf. mormoni*, 177  
*Hypothyridina margarita*, 12  
  
*illinoisensis*, *Rugosochonetes*, 61  
*inaequum*, *Septemirostellum*? 136  
*incerta*, *Prospira*, 17, 18, 25, 26, 33, 203,  
   205, 207  
*inequa*, *Camarotoechia*, 134  
*inflata*,  
   *Avonia*, 101  
   *Crurithyris*, 264  
   *Spinocarinifer*, 15, 36, 103  
*Inflatia*, 33  
*ingens*, *Athyris*, 186  
*injensis*, *Girtyella*, 273  
*inornatus*, *Crassumbo*, 15, 255, 256  
*Institella*, 85  
   *tessellata*, 100  
*Institellata*, 85  
*integricostatus*, *Spirifer*, 243  
*irregularicostatus*, *Semiproductus*, 132  
*irregularis*, *Semiproductus*, 132  
 Ishim Beds, 243  
*isorhyncha*, *Camarophoria*? 148  
  
*jeffersonense*, *Rugaltarostrum*, 160  
*jeremiahensis*, *Mesoplica*? 13, 92, 93  
 Jeremiah  
   Hills, 92, 151, 192  
   Member, 13  
*jonesi*, *Crassumbo*? 15, 254, 255, 256, 257  
  
*kaipingensis*, *Tanshanella*, 234, 235, 236  
*Kansuella maxima*, 37  
*karavankina*, *Echinoconchus*, 123  
  
*kasachotanensis*, *Spirifer*, 215  
 Kashmir Valley, 251  
 Kassin Beds, 103  
 Kazakhstan, 93, 103, 149, 177, 183, 194,  
   243, 257  
 Kellys Knob  
   Member, 12  
   Sandstone member, 6  
*kenerovensis*, *Cryptospirifer*, 14, 197  
*kennedyensis*, *Mucrospirifer*, 228  
 Keokuk Limestone, 67, 125, 183, 186, 188  
*khavae*, *Desquamatia*, 166  
*kimberleyensis*, 167, 170, 171  
   *Atrypa desquamata*, 166, 167, 170  
   *Desquamatia (Synatrypa)* 12, 13, 34, 166,  
   168, 170, 171  
 Kinderhook, 15, 16, 101, 103, 128, 207, 211,  
   267  
 Kinderhookian, 15  
   Logan Formation, 16  
*kinglingensis*, *Camarotoechia*, 36, 139  
 Kinling Limestone, 106  
*Kitakamithyris*, 257, 258, 259, 260  
   *moogooriensis*, 30, 260  
   *occidua*, 15, 17, 24, 258, 259, 260  
   *triseptata*, 260  
   *tyoanjiensis*, 257  
   *uniplicata*, 257, 259, 260  
*Kochiproductus*, 85  
*krapiwnensis*, *Brachythyris*, 243  
*Krotovia*, 33, 108  
 Kulshill No. 1 Well, 22, 27, 125  
 Kununurra Member, 6, 12, 13, 23, 28, 75,  
   89, 264  
 Kuznetsk Basin, 13, 15, 18, 19, 36, 80, 101,  
   103, 119, 122, 132, 134,  
   136, 141, 170, 197, 208,  
   211, 215, 243, 273  
 K zone, 15, 17, 18, 101, 103, 136, 141  
  
 Ladakh Valley, 251  
*laevis*, *Composita*, 180  
*laevicostata*, *Ovatia*, 128  
 Lake Valley Formation, 134, 229  
*Ladjia saltica*, 30  
*laguessianus*, *Rugosochonetes*, 61, 62  
 Lambie Group, 32  
*laminosa*, *Tylothyris*, 18, 35, 224, 227, 228  
*langfieldensis*, *Syringothyris*, 19, 249, 251,  
   253  
*Langfieldensis* zone, 15, 18, 19, 26  
 Langfield Point 26, 253  
*larga*, *Spinatrypa prideri*, 13, 23, 34, 172,  
   174, 175, 176  
*Stegacanthia abbotti*, 119, 120  
*laticardinalis*, *Brachythyris*, 19, 243  
*latus arenatus*, *Ectochoiristites*, 233  
 Laurel Downs No. 2 Bore, 29  
*laurelensis*, *Unispirifer*, 16, 25, 29, 30, 35,  
   36, 208, 211  
*laurelensis* zone, 16, 25, 30  
 Laurel Formation, 29, 30, 42, 148, 211  
*legayi*, *Spinatrypa*, 175  
 Legune  
   Homestead, 17, 24, 207  
   track, 182

*Leioproductus*, 14, 35  
     *buttonensis*, 14, 89, 90, 91  
     *plicatus*, 90  
*Leptagonia analoga*, 15, 19, 26, 32, 35, 36, 37  
     cf. *analoga*, 37  
*Leptothyris*, 178  
*Levipustula*, 108  
*levis zone*, 34  
*levisulcatus*, *Austrochoristites*, 16, 17, 24, 25, 26, 231, 233  
*licitor*, *Tenticospirifer*, 13, 102  
Lime Creek Formation, 13, 171, 175, 201, 202  
*lineata*,  
     *Martinothyris*, 262  
     *Phricodothyris*, 257  
*Lingula*, 27  
*Liraspirifer*, 188  
*Lissochonetes*, 33  
*Litothyris*, 237  
     *alticostata*, 14, 238  
*llanoensis*, *Fusella*, 208  
*loganensis*, *Rugosochonetes*, 62  
Logan Formation, 35  
*Lomatiphora*, 33, 84, 85, 86  
     *aquila*, 15, 16, 24, 86, 87, 94, 110  
     *aquila zone*, 24, 25  
*Lomatiphorinae*, 84  
Longs Wells, 175  
Louisiana Limestone, 250  
Lower *Manticoceras* Zone, 264  
Lower Tournaisian, 14  
*lucerna*, *Phricodothyris*, 257  
*lucida*, 150, 151, 162  
     *Camarotoechia*, 138, 151  
     *Ptychomaletoechia*, 13, 14, 28, 35, 149, 150, 151, 162  
*lydekkeri*, *Syringothyris*, 251  
*macgregori*, *Rugosochonetes*, 21, 20, 36, 55, 62, 64, 69  
*macropatus*, *Plicochonetes*, 71  
*macrura*, *Magnumbonella*, 114  
*madisonense*, *Rugaltarostrium*, 157, 160  
*magna*, *Desquamatia*, 166  
*Magnumbonella*, 33, 114  
     *macrura*, 114  
     *prolata*, 16, 17, 26, 29, 30, 91, 112, 114  
*magnus*, *Cyrtospirifer calcaratus*, 194  
*Rugosochonetes kennedyensis*, 68  
Marbal Valley 251  
*margaritacea*, *Productina*, 20, 36, 94, 96  
*margaritaceus*, *Argentiproductus*, 94  
*margarita*, *Hypothyridina*, 12  
*Marginatia*, 27  
     *burlingtonensis*, 18, 122  
     *deruptoides*, 18, 36, 122  
     *fernghensis*, 122  
     *mimica*, 17, 18, 20, 29, 34, 36, 120  
     *vaughni*, 122  
*Marginicinctus*, 85  
*Marginirugus*, 33, 34  
     *parringtonensis zone*, 34  
     *papilionacea*, 21  
*Martiniella*, 244  
     *nasuta*, 244  
*Martiniinae*, 244  
*Martinothyris*, *lineata*, 262,  
*marylandicus*, *Retichonetes*, 71  
*mathesonensis*, *Globosochonetes?* 13, 74  
Matheson Ridge, 75, 89, 264  
*maxima*, *Kansuella*, 37  
*mediocris*, *Spirifer*, 19, 36  
*Megachonetes*, 79  
     *murchisoni*, 80  
     *zimmermanni*, 20, 36, 79, 80  
Meister Beds, 194  
*meisteri*, *Productus*, 132  
*membranacea*,  
     *Productella*, 89  
     *Steinhagella*, 89  
*?Merista*, 33  
*Meristella*, 14  
*Mesoplica?* 93  
*Mesoplica*, 91, 92  
     *?jeremiahensis*, 13, 92, 93  
     *praelonga*, 92, 93  
     *praelonga simplicior*, 93  
     *simplicior*, 93  
*metallica*, *Camarotoechia*, 134  
*metallicum*, *Septemirostellum?* 144  
*micans*, *Anatrypa*, 166, 167  
*michelini?*, *Rhipidomella*, 17, 19, 26, 27, 29, 30, 33, 35, 41  
*milliganensis*, *Anthracospirifer*, 20, 27, 36, 37  
*milliganensis zone*, 21, 22, 27  
Milligans  
     Beds, 8, 20, 127  
     Hills, 21, 27, 223  
*Mimatrypa*, 170  
*mimica*, *Marginatia*, 17, 18, 20, 29, 34, 36, 120  
*minilya*, *Cleiothyridina*, 19, 29, 30, 35, 36, 183, 185, 186, 187  
*minilyensis*, *Schellwienella*, 30  
*minnewankensis*, *Unispirifer*, 35, 211  
Mississippian Pella Formation of Iowa, 117  
*missouriensis*,  
     *Anthracospirifer*, 220  
     *Spirifer*, 215  
*mitchelleanensis*, 141  
     *Camarotoechia*, 134  
     *Septemirostellum*, 35, 136, 141  
*montana*, 271, 272  
     *Cranaena*, 17, 18  
*monticolaformis*, *Cyrtospirifer*, 193  
Moogooree Limestone, 18, 30, 42, 138, 186, 253, 260, 267  
*moogoorensis*, *Kitakamithyris*, 30, 260  
*mormoni*, *Hustedia*, 177  
*mosensis*, *Rugosochonetes*, 69  
*moshihlingensis*, '*Camarophoria*', 36, 139  
Moscow Basin, 18, 19  
Mount  
     Greenock, 211  
     Morgan, 253  
     Septimus, 17, 24, 25, 26  
     Zimmerman, 26, 253  
*mucronatus*, *Punctospirifer* 19, 20, 30  
*Mucrospirifer kennedyensis*, 228

- multimoda*, *Atrypa*, 170  
*multirugata*, '*Rhynchonella*', 144  
Munabia Sandstone, 30  
*mundula*, *Spirifera*, 229  
*murchisoni*, *Megachonetes*, 80  
*muricatus*,  
    *antiquatonia*, 117  
    *Productus*, 117  
  
*nalivkini*, *Nayunnella*, 162  
Namurian, 21, 22, 32, 33, 36, 146, 228  
Napier Formation, 14, 150  
*nasuta*, *Martiniella*, 244  
*Nayunnella*, 35, 160, 162  
    *acutiplicata*, 162  
    *ericsoni*, 162  
    *nalivkini*, 162  
    *simplicata*, 160, 162  
    *turgida*, 13, 14, 160, 161, 162  
    *zuleika*, 162  
Neil's Creek clastics, 253  
*Neochonetes*, *dominus*, 55, 58  
Netersinsky Beds, 16, 19, 215  
New England Geosyncline, 32  
*niger*,  
    *Avonia*, 36  
    *Productus*, 101  
    *Spinocariniifera*, 14, 35, 102, 103  
*Ningbingella*, 152, 153, 155  
    *flexuosa*, 15, 152, 153, 155, 156  
    *Cyrtospirifer*, 14, 35, 188, 190, 192, 193, 194, 197  
  
Ningbing  
    homestead, 27  
    Limestone, 6, 8, 13, 15, 24, 28, 35, 92, 150, 151, 157, 158, 190, 192, 193, 197, 237, 259  
    Range, 156, 190, 194  
*Nix*, *angulata*, 58  
*novamexicana*  
    *Delthyris*, 207  
    *Spirifera*, 228, 229  
*nox*, *Spirifer*, 21  
*numida*, *Steinhagella*, 13, 23, 88, 89  
  
Oberen Kohlenkalk, 20  
*obmaxima*, *Cleiothyridina*, 35, 36, 186, 188  
*obtectus*, *Rugosochonetes*, 14, 17, 24, 25, 26, 29, 30, 55, 58, 61, 62  
  
*occidentalis*, *Cranaena*, 271, 272  
*occidua*,  
    *Kitakamithyris*, 15, 17, 24, 258, 259, 260  
    *Productella*, 30, 83  
Old Canindah, 207  
*omaliusi*, *Ptychomaletoechia*, 151  
Ord River, 194  
*ornamenta*, *Schellwienella*, 36  
*ornata*,  
    *Athyris*, 186  
    *Schellwienella*, 21  
*Orthis caduca*, 46  
*Orthotetes*  
    *australis*, 22  
    *australis* zone, 17, 18, 19  
*ottumwa*, *Pugnoides*, 153, 157  
  
*otwayi*, *Spirifer*, 15, 212, 215  
Ouray Limestone, 35  
*Ovatia elongata*, 128  
    *laevicosta*, 128  
    sp. A, 15, 128, 129  
    sp. B, 22, 129  
*ovatus*, *Productus*, 128  
*Overtonia fimbriata*, 85  
*Palaeochoristites*, 230  
*pamiricus*, *Cyrtospirifer pamiricus*, 193  
*papilionacea*,  
    *Chonetes*, 80  
    *marginirugus*, 21  
*parabisulcatus*, *Spirifer*, 21, 37  
Paradise Formation, 125  
*paralis*, *Cyrtospirifer pamiricus*, 35, 193  
*Parallelodon*, 27  
*parseptum*, *Globosochonetes*, 73  
*parva*  
    *Atrypa*, 170, 174  
    *Protoniella*, 117  
*parvirostra*, *Athyris*, 183  
*pauciplicatus*, *Punctospirifer*, 20, 265, 267, 268  
  
*pauciplicatus* zone, 20, 21  
*paula*, *Hustedia*, 176, 177  
*pauperum*, *Atribonium*, 165  
*pectinata*, *Desquamatia (Seratrypa)*, 166  
*peculiaris*, *Brachythyris*, 19, 22, 35, 244  
*peltata*, *Schuchertella*, 14, 15, 16, 24, 43, 44, 461  
  
*pentagonus*, *Spirifer*, 19  
Percha  
    Formation, 97  
    Shale, 14, 35, 151  
*Perissothyris*, 33  
*Phestia*, 27  
*Phricodothyris*, 257, 258  
    *lineata*, 257  
    *lucerna*, 257  
    *tripustulosa*, 258  
*piersonensis*, *Spirifer*, 207  
Pierson Limestone, 207  
Pillara  
    Formation, 14, 150  
    Limestone, 28  
Pincombe Range, 24  
*pinguis*, *Schizophoria resupinata*, 40  
*planimedia*, *Tylothyris*, 228  
*planosulcata*, *Spinatrypa*, 13, 175  
*planulata*, *Brachythyris*, 15, 241, 243, 244  
*planumbonus*, *Rugosochonetes*, 66  
*platynotus*, *Unispirifer*, 14, 35, 211  
*Plebejochonetes*, 55  
*plebejus*, *Plebejochonetes*, 55  
    *plebejus*, 55  
    *semiradiatus*, 55  
*pleurodon*, 152  
    *Camarotoechia*, 148  
    *Pleuropugnoides*, 152  
    *Terebratula*, 146  
*Pleuropugnoides*, 21, 33, 146, 151, 152  
    *greenleighonensis*, 146  
    *pleurodon*, 152  
    Sp. with *P. pleurodon*, 36  
*Plicanoplia*, 72

- plicatosulcatus*, *Punctospirifer*, 16, 17, 24, 26, 30, 269, 270
- plicatus*, *Leioproductus*, 90
- Plicochonetes*, 55
- crassistrius*, 57
- macropatus*, 71
- Podtsheremia*, 33, 216, 217, 219
- acutisimilis*, 219
- ?humilicostata*, 20, 21, 36, 37, 217, 219, 220, 222
- prima*, 217, 219, 223
- ?thomasi*, 20, 21, 27, 36, 37, 217, 221, 222, 223
- Point Spring, 69, 79, 120, 127
- Sandstone, 8, 21, 22, 27, 127, 129
- Pond Argillite, 228
- Porostica*, 153
- Port Keats, 125
- portlockiana*, *Schuchertella*, 44
- praecedens*, *Sentosia*, 97
- praecursor*, *Sentosia*, 97
- praelonga*, *Mesoplicia*, 92, 93
- prava*, *Schuchertella*, 48
- Pretlove Hills, 176, 202
- prideri*, 174
- Atrypa aspera*, 174
- Spinatrypa*, 174, 175
- Spinatrypa prideri*, 30, 174, 175
- prima*, 17, 205, 223
- Podtsheremia*, 217, 219, 223
- Prospira*, 17, 33, 205
- Prisca gladbachensis*, 171
- Productacean, 130, 131
- gen. et sp. A, 15, 24
- gen. et sp. B, 14
- Productella*, 83
- applingtonensis*, 84
- calva kosharica*, 83
- herminae*, 83
- membranacea*, 89
- occidua*, 30, 83
- sheffieldensis*, 84
- subaculeata*, 83
- westwoodensis*, 13, 23, 82, 83
- Productina*, 93, 94
- margaritacea*, 20, 36, 94, 96
- sampsoni*, 94
- cf. *margaritacea*, 37
- Productininae, 93
- productoides*, *Strophalosia*, 89
- ?Productus*
- arcuatus*, 101
- bassus*, 101
- Productus*,
- gradatus*, 125
- kinglingensis*, 106
- meisteri*, 132
- muricatus*, 117
- niger*, 101
- ovatus*, 128
- sedaliensis*, 106
- subaculeatus*, 84
- tenuicostus*, 128
- vaughni*, 106
- prolata*, *Magnumbonella*, 16, 17, 26, 29, 30, 91, 112, 114
- Prospira*, 202, 203, 208
- burnettensis*, 207
- incerta*, 17, 18, 25, 26, 33, 203, 205, 207
- prima*, 17, 33, 205
- travesi*, 19
- proteus*, 'Avonia', 103
- proteus zone*, 28, 29
- ?Protoniella*, 33
- parva*, 117
- Protoniella*, 115
- beedi*, 115
- ?waggonensis*, 17, 26, 30, 116, 117
- pseudolineatus*, *Torynifer*, 36
- Pterinopecten*, 27
- Ptychomaletoechia*, 149
- ?deltidialis deltidialis*, 149, 151
- ?deltidialis transversaria*, 149
- elburzensis*, 149
- lucida*, 13, 14, 28, 35, 149, 150, 151, 162
- omaliusi*, 151
- Rhynchonella turanica*, 149
- Pugnax*, 152
- acuminatus*, 37, 152
- asiaticus*, 37
- pugnus*, 152, 154
- sp. cf. *P. pugnus*, 156
- Pugnoides*, 153
- boonensis*, 153, 155
- erugatus*, 14, 156, 157
- ottumwa*, 153, 157
- pugnus*, *Pugnax*, 152, 154, 156
- punctatus*, *Echinoconchus*, 123
- Punctospirifer*, 22, 27, 48
- amblys*, 270
- mucronatus*, 19, 20
- pauciplicatus*, 20, 265, 267, 268
- pauciplicatus zone*, 20, 26
- plicatosulcatus*, 16, 17, 24, 26, 30, 269, 270
- scabricostus*, 267, 269
- solidirostris*, 267
- sulcifer*, 270
- transversus*, 20, 270
- uttingi*, 18, 20, 267, 270
- Pustula*, 85, 108
- putilla*, *Brachythyris*, 237
- pygmaea*, *Hustedia*, 177
- quadrangularis*, *Spirifer*, *tenticulum*, 202
- Quadrantes*, 58
- Quadratia*, 33
- (*Quasiavonia*), *Avonia*, 100
- radialis*, *Hustedia*, 177
- Ragged Range Conglomerate Member, 6
- randalli*, *Syringothyris*, 248, 249
- rara*, *Tenticospirifer*, 202
- raricostata*, *Rhytiophora*, 35, 99
- reprinki*, *Schellwienella*, 21, 37
- resupinata*, *Schizophoria*, 33, 35, 36, 38, 40
- Retichonetes*, 69, 71
- amatus*, 69, 71
- arenarius*, 13, 69, 71, 72
- douvillei*, 71

- marylandicus*, 72  
*vicinus*, 71  
*Retichonetinae*, 69  
*?Retzia*, 33  
*Rhipidomella fortimuscula* zone, 34, 68, 119, 270  
*Rhipidomella*  
*michelini?* 17, 19, 26, 27, 29, 30, 33, 35, 41  
*michelini divaricata*, 42  
*rhomboidea*, *Spirifer*, 208, 257  
*'Rhynchonella' multirugata*, 144  
*Rhytiophora*, 33  
*blairi*, 98  
*calhounensis*, 15, 35, 98, 99  
*raricostata*, 35, 99  
*sp. cf. R. calhounensis*, 98  
*sp. cf. R. raricostata*, 16, 25, 29, 99  
*Ripidorhynchus*, 149  
*roemerianus*, *Spirifer*, 207  
*romingeri*, *Cranaena*, 270, 271  
*Rossirhynchus*, 133, 146  
*adamantinus*, 133  
*?Rotaia*, 33  
*Rudny Altai region*, 64  
*Rugaltarostrum*, 35, 157, 158, 160  
*australe*, 13, 14, 157, 158, 159  
*gibbosum*, 160  
*jeffersonense*, 160  
*madisonense*, 157, 160  
*Rugosochonetes*, 27, 55, 58, 60, 69  
*angulata*, 62  
*auriculus*, 66  
*celticus*, 21, 36, 64  
*delicatus*, 64  
*demini*, 61  
*gloucesterensis*, 68  
*hardensis*, 58, 64, 69  
*illinoisensis*, 61  
*kennedyensis*, 21, 55, 64, 67, 68, 69  
*kennedyensis magnus*, 68  
*kinghiricus transversus*, 67  
*laguessianus*, 61, 62  
*loganensis*, 62  
*macgregori*, 20, 21, 36, 55, 62, 64, 69  
*mosensis*, 69  
*obtectus*, 14, 17, 24, 25, 26, 29, 30, 55, 58, 61, 62  
*planumbonus*, 66  
*sillesii*, 21, 36, 64  
*transversalis*, 21, 36, 66  
*ustulatus*, 20, 21, 36, 65, 66, 67  
*?werriensis*, 68  
*sp. cf. R. kennedyensis*, 21, 55, 68, 69  
*Rugosochonetinae*, 54  
*Rundle Formation*, 211  
*Sadler Formation*, 83  
*Salem*, 21, 220, 223  
*Limestone*, 125  
*saltica*, *Ladja*, 30  
*saltica* zone, 28  
*sampsoni*, *Productina*, 94  
*Sandy Creek* 25, 100, 140, 182, 233  
*Sanguinolites*, 27  
*Serratocrista*, 20  
*scabricostus*, *Punctospirifer*, 267, 269  
*Schellwienella*, 22, 27  
*australis*, 18, 19, 35  
*australis* zone, 18, 26  
*sp. cf. S. australis*, 18  
*burlingtonensis*, 19, 35  
*cf. burlingtonensis* zone, 17, 34  
*crenistria*, 19  
*sp. cf. S. minilyensis*, 30  
*ornamenta*, 36  
*ornata*, 21  
*reprinki*, 21, 37  
*(Schellwienella) weaberensis*, 53  
*weaberensis*, 21, 27, 36, 53, 54  
*schelonius*, *Cyrtospirifer*, 193  
*Schistochonetes*, 33, 54, 55  
*abruptus*, 20, 21, 57  
*Schizophoria*, 37  
*resupinata*, 33, 35, 36, 38, 40  
*sp. cf. S. resupinata*, 14, 19, 26, 27, 29, 37, 41, 38  
*resupinata dorsosinuator*, 40  
*resupinata pinguis*, 40  
*verulamensis*, 41  
*Schnurella*, 160  
*schnuri*, 160  
*schnuri*, *Schnurella*, 160  
*schroeteri*, *Desquamatia* (?*Desquamatia*), 171  
*Schuchertella*, 14, 29  
*concentrica*, 46  
*devonica*, 48  
*dorsiplana*, 16, 17, 25, 29, 30, 44, 45, 46  
*dromeda*, 44, 48  
*gratillica*, 44  
*gueizhouensis*, 45  
*peltata*, 14, 15, 16, 24, 43, 44, 46  
*portlockiana*, 44  
*prava*, 48  
*subcancellata*, 44  
*sp. cf. S. gratillica*, 14, 47, 48  
*sp. cf. S. prava*, 48  
*scopimus* zone, 28  
*sedaliensis*, *Productus*, 106  
*semicostata*, ? *Avonia*, 101  
*Semicostella*, 101  
*Semiluki Beds*, 13, 202  
*Semiproductus*  
*irregularicostatus*, 132  
*irregularis*, 132  
*semiradiatus*, *Plebejochonetes*, 55  
*semireticulatus*, *Dictyoclostus*, 125, 127  
*Sentosia*, 35, 97  
*praecedens*, 97  
*praecursor*, 97  
*subquadrata*, 13, 14, 96, 97  
*Septemirostellum*, 26, 33, 132, 133, 134, 139, 143, 144, 146, 148  
*? acutirugatum*, 17, 18, 36, 136, 141  
*amnicum*, 17, 18, 30, 32, 35, 36, 133, 134, 137, 138, 139, 144, 151  
*amnicum* zone, 17, 25, 26, 29,  
*? chouteauensis*, 35, 136  
*? inaequum*, 136  
*? metallicum*, 144

- mitchelleanensis*, 35, 136, 141  
*septimum*, 18, 20, 134, 135, 138, 140, 143, 144  
*simplex*, 16, 17, 25, 35, 36, 134, 135, 136, 139, 140, 141, 143, 144  
? *tereticostum*, 14, 134, 141, 142, 143  
? *tidwellae*, 136  
*septima*, *Camarotoechia*, 25, 140  
*septimum*, *Septemirostellum*, 18, 20, 134, 135, 138, 140, 143, 144  
*Septimus Limestone*, 8, 15, 17, 18, 19, 20, 25, 26, 30, 34, 42, 110, 140, 143, 186, 243, 249, 260, 262, 267, 270  
*septimus*, *Unispirifer*, 18, 19, 20, 36  
*Serratocrista*, 20, 33, 36, 48, 49  
*Setigerites*, 85  
*Seratrypa*, 166  
*sheffieldensis*, *Productella*, 84  
*Shi-teng-tzu Limestone*, 139  
*shoshonensis*, *Anthracospirifer*, 21, 37, 220, *Shumardella*, 152  
*sibirica*,  
*Stegacanthia*, 36, 119  
*Stegacanthia sibirica*, 119  
*silleesi*, *Rugosochonetes*, 21, 36, 64  
*similis*, *Spirifer*, 19, 36  
*simplex*, *Septemirostellum*, 16, 17, 25, 35, 36, 134, 135, 136, 139, 140, 141, 143, 144  
*simplicior*,  
*Mesoplica*, 93  
*Mesoplica praelonga*, 93  
*Sinospirifer*, 188  
*Sinotectirostrum*, 133  
*Skaly Beds*, 174  
*sobrina*, *Camarotoechia*, 14, 35, 151  
*solidirostris*, *Punctospirifer*, 267  
*sol*, *Spirifer*, 34  
*Sorby Hills*, 24, 88  
*Spinatrypa*, 165, 167, 171, 172  
*aspera*, 174  
*aspera aspera*, 175  
*legayi*, 175  
*planosucata*, 13, 175  
*prideri*, 174, 175  
*prideri larga*, 13, 23, 34, 172, 174, 175, 176  
*prideri prideri*, 30, 174, 175  
*Spinatrypina*, 171, 172, 175  
(*Exatrypa*) *tubaecostata*, 175  
*Spinauris*, 33, 107, 108  
*cristata*, 19, 108, 109, 112  
*cristata?* 16, 26, 30  
*sulcata*, 19, 110, 111, 112  
*Spinocarinifera*, 33, 100, 101, 103  
*adunata*, 14, 15, 35, 36, 101, 103, 118  
*adunata zone*, 14, 24  
? *arcuata*, 15, 35, 103  
? *bassa*, 103  
*inflata*, 15, 36, 103  
*niger*, 14, 35, 102, 103  
*spinosa*, *Atrypa*, 176  
*Spinulicosta*, 103  
*spinulosus*, *Dorsoscyphus*, 20, 21, 50  
*Spirifera*  
*mundula*, 229  
*novamexicana*, 228, 229  
*Spirifer*, 27, 212, 215, 216, 217  
*attenuatus*, 19, 20, 35  
*biplex*, 36, 136, 141  
*biplicoides*, 207  
*bisulcatus*, 36  
*carinatus*, 215  
*chappelensis*, 15, 212  
*duplicostatus*, 21, 36, 219, 220, 223  
*aff. duplicostatus*, 33  
*fusiformis*, 208  
*haydenianus*, 37, 216  
*aff. integricostatus*, 243  
*kasakhstanensis*, 215  
*mediocris*, 19, 36  
*missouriensis*, 215  
*nox*, 21  
*otwayi*, 15, 212, 215  
*parabisulcatus*, 21, 37  
*pentagonus*, 19  
*piersonensis*, 207  
*rhomboidea*, 208, 257  
*roemerianus*, 207  
*similis*, 19, 36  
*sol*, 34  
*spiritus*, 19, 20, 35  
*spiritus zonal assemblage*, 10  
*spiritus zone*, 19, 26  
*striatus*, 212, 216  
*subrotundatus*, 243  
*tersiensis*, 15, 215  
*tornacensis*, 208  
*ventricosus*, 19, 36  
*cf. tenticulum* var. *quadrangularis*, 202  
*Spiriferellina*, 33  
*Spirit Hill*, 24, 26, 127, 234  
*spiritus*, *Spirifer*, 19, 20, 35  
*spiritus zone*, 18, 19, 20, 30  
*spissa*, *Syringothyris*, 30, 253, 254  
*Stegacanthia*  
*abbotti larga*, 119, 120  
*biseriata*, 124  
*bowsheri*, 119  
*sibirica*, 36, 119  
*sibirica artyshtensis*, 119  
*sibirica sibirica*, 119  
*strigis*, *Stegacanthia*, 20, 36, 118, 119  
*membranacea*, 89  
*numida*, 13, 88  
*St Genevieve Limestone*, 157  
*St Louis Limestone*, 125, 128  
*stolbovi*, 201  
*Cyrtospirifer*, 201  
*'Cyrtospirifer'*, 201  
*Tenticospirifer*, 201  
*Streptorhynchus*, 33  
*Striatifera*, 37  
*striatus*, *Spirifer*, 212, 216  
*strigis*, *Stegacanthia*, 20, 36, 118, 119  
*Strophalosia productoides*, 89  
*subaculeata*, *Productella*, 83



- subaculeatus*, *Productus*, 84  
*subcancellata*, *Schuchertella*, 44  
*subconica*, *Tylothyris subconica*, 224  
*subelegans*, *Echinoconchus*, 123  
*subglobosa*, *Camarotoechia*, 148  
*sublamellosa*, *Cleiothyridina*, 183  
*subquadrata*, *Sentosia*, 13, 14, 96, 97  
*subrotundatus*, *Spirifer*, 243  
*subzonata*,  
     *Desquamatia*, 166  
     *Desquamatia* (*Synatrypa*), 170  
*sulcata*, *Spinauris*, 19, 110, 111, 112  
*sulcifer*, *Punctospirifer*, 270  
*supervilis*, *Tenticospirifer*, 202  
 Surprise Creek Gorge, 160  
*Synatrypa*, 165, 166, 170  
 (*Synatrypa*), *Desquamatia*, 65, 167, 170, 171  
*symplicata*, *Nayunnella*, 160, 162  
*Syringopleura*, 248, 249  
*Syringothyridinae*, 248  
*Syringothyris*, 248, 249, 250, 254  
     *angulata*, 248  
     *australis*, 253  
     *bedfordensis*, 251  
     *bifida*, 248  
     *bifida* zone, 34  
     *chemungensis*, 19, 253  
     *cuspidata*, 248, 250  
     *distans*, 248, 251  
     *elongata*, 19, 253  
     *fontanalis*, 21, 248, 249, 250, 251  
     *hanibalensis*, 250, 251  
     *langfieldensis*, 19, 249, 251, 253  
     *langfieldensis* zone, 19, 26  
     *lydekkeri*, 251  
     *randalli*, 248, 249  
     *spissa*, 30, 253, 254  
     sp. cf. *S. spissa*, 253  
     *texta*, 250  
 Taidon Beds, 15, 16, 19, 215  
*Tangshanella*? 27, 33  
*Tangshanella*  
     ? *fasciculata*, 19, 234, 235  
     *kaipingensis*, 234, 235, 236  
 Tanmurra  
     Creek, 26, 160  
     Formation, 8, 22, 27, 125  
*teichertii*, *Acanthocosta*, 15, 24, 29, 104, 106, 107  
*teichertii* zone, 14, 15, 29  
 Tellebang Formation, 207  
*Tenticospirifer*, 197, 201, 217  
     *aperturata cuspidata*, 201  
     *aperturata verneuilliformis*, 201  
     *columnaris*, 13, 23, 34, 198, 200, 201  
     *cyrtinaformis*, 13, 201  
     *hsikuangshanensis*, 202  
     *lictor*, 13, 202  
     *rara*, 202  
     *stolbovi*, 201  
     *supervilis*, 202  
     *tenticulum*, 197, 202  
     *vilis*, 202  
*tenticulum*, *Tenticospirifer*, 197, 202  
*tenuicostus*, *Productus*, 128  
*tenuistriata*, *Tulcumbella*, 34  
*Terebratula pleurodon*, 146  
*tereticostum*, *Septemirostellum*? 14, 134, 141, 142, 143  
*tersiensis*, *Spirifer*, 15, 215  
*tessellata*, *Institifera*, 100  
*texana*,  
     *Amesopleura*, 229  
     *Cranaena*, 272  
 Texas, 15  
*texta*, *Syringothyris*, 250  
*Thomasaria*? *voiseyi*, 256  
*Thomasella*, 85  
*thomasi*, *Podtsheremia*? 20, 21, 36, 37, 217, 221, 222, 223  
 Three Forks Formation, 160  
*tidwellae*, 136  
     *Camarotoechia*, 134  
     *Septemirostellum*? 136  
*Tomiproductus*, 104  
*tornacensis*, *Spirifer*, 208  
 ? *Tornquistia*, 33  
*torrida* zone, 28  
*Torynifer*? 262  
*Torynifer*, 33, 257, 262  
     *dorsiseptatus*, 262  
     ? *dorsiseptatus*, 18, 19, 36, 260  
     *pseudolineatus*, 36  
 Tournaisian, 6, 8, 14, 15, 16, 17, 18, 19, 20, 24, 25, 28, 29, 32, 33, 35, 36, 64, 80, 84, 101, 103, 106, 115, 118, 119, 122, 132, 133, 134, 136, 141, 146, 186, 203, 215, 243, 259  
 Abishevsky Beds, 14, 197, 273  
 Bankcroft Formation, 17  
 breccia, 207  
 Laurel Formation, 17  
 Pond Argillite, 68  
 Ruzakov Beds, 177  
 Taidon Bed, 211  
 Tulumba Sandstone, 272  
*transversalis*, *Rugosochonetes*, 21, 36, 66  
*transversaria*, *Ptychomaletoechia*? *deltidialis* 149  
*transversa*, *Tylothyris*, 17, 18, 35, 224, 226, 227, 288  
*transversus*,  
     *Punctospirifer* 20, 270  
     *Rugosochonetes kinghiricus*, 67  
*travesi*, *Prospira*, 19  
*tripla*, 148  
*tripustulosa*, 148  
     *Phricodothyris*, 258  
*triseptata*, *Kitakamithyris*, 260  
*tscherepeti*, 248  
     *Eomartiniopsis*, 248  
*tubaecostata*, *Spinatrypina* (*Exatrypa*), 175  
*Tulcumbella*, 33  
     *tenuistriata*, 34  
*turanica*, *Ptychomaletoechia* *Rhynchonella* 149  
*turgida*, *Nayunnella*, 13, 14, 160, 161, 162  
*turgidus*, *Crassumbo*, 15, 256  
*tuta*, *Camarotoechia*, 134  
*Tylothyris*, 224  
     *laminosa*, 18, 35, 224, 227, 228

- planimedia*, 228  
*subconica subconica*, 224  
*transversa*, 17, 18, 35, 226, 227, 228  
*yoanjiensis*, *Kitakamithyris*, 257  
*uniplicata*, *Kitakamithyris*, 257, 259, 260  
*Unispirifer*, 203, 208, 211, 217  
*fluctuosus*, 29, 30  
*fluctuosus* zonal assemblage, 29, 30  
*laurelensis*, 16, 25, 29, 30, 35, 36, 208, 211  
*minnewankensis*, 35, 211  
*platynotus*, 16, 35, 211  
*septimus*, 18, 19, 20, 36  
*ussiensis*, 36  
Upper Devonian Iberger Limestone, 83  
Upper *Manticoceras* zone, 12, 265  
Upper *Michelinia* zone, 76  
Urals, 14  
*urei*, *Crurithyris*, 264  
*ussiensis*,  
*Fusella*, 16, 211  
*Unispirifer*, 36  
*ustulatus*, *Rugosochonetes*, 20, 21, 36, 65, 66, 67  
Utting  
*Calcarenite*, 8, 20, 26, 37, 42, 64, 67, 69, 79, 94, 96, 127, 144, 178, 185, 186, 217, 222  
Gap, 26, 27, 64, 67, 71, 80, 178  
*uttingi*,  
*Delepinea*, 20, 36, 75, 76, 78, 79  
*Punctospirifer*, 18, 20, 267, 270  
*Variatrypa*, *ajugata*, 166  
*vaughni*,  
*Marginatia*, 122  
*Productus*, 106  
*ventricosus*, *Spirifer*, 19, 36  
*venustus*, *Echinoconchus*, 123  
*verneuili*, 193  
*verneuiliiformis*, *Tenticospirifer aperturata* 202  
*verulamensis*, *Schizophoria*, 41  
*vicinus*, *Retichonetes*, 71  
*vilis*, *Tenticospirifer*, 202  
Visean, 8, 18, 19, 20, 21, 22, 27, 32, 33, 35, 36, 37, 64, 66, 67, 79, 80, 96, 119, 177, 182, 183, 203, 216, 219, 223, 228, 230, 243  
Brazer Limestone, 216  
*vittatus*, *Echinoconchus*, 125  
*Voiseyella*, 207, 228, 229  
*anterosa*, 228, 229  
*voiseyi*,  
*Crassumbo*, 257  
*Thomasaria?* 256  
*Waagenoconcha*, 107, 108  
Waggon Creek  
Breccia, 8, 22, 27  
Valley, 8, 26, 27, 115, 116, 118, 263  
*waggonensis*, *Protoniella?* 17, 26, 30, 116, 117  
*weaberensis*,  
*Schellwienella*, 21, 27, 36, 53, 54  
*Schellwienella* (*Schellwienella*), 53  
Weaber Range, 21, 32, 27, 69, 79, 127, 129, 251  
*wellsvillensis*, *Girtyella*, 273  
*werriensis*, *Rugosochonetes?* 68  
Westwood  
Creek, 84, 201  
Member, 6, 12, 13, 23, 28, 167, 174, 200, 264  
*westwoodensis*, *Productella*, 13, 23, 82, 83, 84  
*whitneyi*, *Cyrtospirifer*, 35, 194  
Willaraddie Formation, 30  
Williambury Formation, 30  
*woodworthi*, *Girtyella*, 273  
Yagovkin Beds, 243  
Yindagindy Formation, 32  
*youngiana*, *Avonia*, 100  
*Yunanella*, 153, 160  
*Yunnanellina*, 160  
*ziganensis*, *Cyrtospirifer*, 14, 197  
Zimmerman Sandstone, 8, 19, 20, 25  
*zimmermanni*, *Megachonetes*, 20, 21, 36, 79, 80  
zonal assemblage of *Anthracospirifer milliganensis*, 10, 20  
*zonata* *Desquamatia* (*Variatrypa*), 166  
*zonataeformis*, *Desquamatia*, 13, 170  
zone of  
*Acanthocosta teichertii*, 15, 24, 29  
*adunata*, 14  
*ammicum*, 15, 16, 17, 18, 26, 30, 207  
*Amphipora ramosa*, 12  
*Anthracospirifer milliganensis*, 20, 21, 27  
*apena*, 13, 264  
*aquila*, 15, 16, 17, 24, 25, 26, 207  
*australis*, 17, 18, 19  
C, 18, 19, 136, 141, 228, 253  
*Crurithyris apena*, 9, 12, 23, 28  
*Cyrtospirifer ningbingensis*, 13, 23  
D, 18, 228  
D2, 19, 253  
*Delepinea aspinosa*, 22  
*eganensis*, 17, 18, 25, 26, 30  
Famennian, 103  
Frasnian *torrida*, 175  
*Gattendorfia*, 8, 9  
*Grammorhynchus eganensis*, 17, 25, 29  
K, 15, 17, 18, 100, 103, 136, 141  
*langfieldensis*, 15, 18, 19, 26  
*laurelensis*, 16, 25, 30  
*Levipustula levis*, 34  
*Lomatiphora aquila*, 24  
'Lower *Manticoceras*', 264  
*Marginirugus barringtonensis*, 34  
*milliganensis*, 21, 27  
*Orthotetes australis*, 34, 22  
*pauciplicatus*, 20, 21  
*proteus*, 28, 29  
*Punctospirifer pauciplicatus*, 20  
*Rhipidomella fortimuscula*, 34, 68, 119, 270  
*saltica*, 28  
*Schellwienella australis*, 18, 26  
*Schellwienella* cf. *burlingtonensis*, 17, 34

*scopimus*, 28  
*Septemirostellum amnicum*, 17, 25, 26, 29  
*Spinocarinfera adunata*, 14, 24  
*Spirifer spiritus*, 19, 26  
*spiritus*, 18, 19, 20, 30  
*Syringothyris langfieldensis*, 19, 26  
*teicherti*, 14, 15, 29  
*torrida*, 28  
Upper *Manticoceras*, 12, 264  
Upper *Michelinia*, 76  
Z, 18, 19, 136, 141, 228, 253  
*zuleika*, *Nayunnella*, 162  
Z Zone, 18, 19, 136, 141, 228, 253