THE LOWER TERTIARY FLORAS OF SOUTHERN ENGLAND

I

PALAEOCENE FLORAS
LONDON CLAY FLORA (Supplement)

ATLAS

BRITISH MUSEUM (NATURAL HISTORY)

THE LOWER TERTIARY FLORAS OF SOUTHERN ENGLAND

I

PALAEOCENE FLORAS
LONDON CLAY FLORA *(Supplement)*

BY
MARJORIE ELIZABETH JANE CHANDLER

With an Atlas of thirty-four plates
and fifty-four figures in the text

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Explanation of Plate 1

Fig.

Osmundites dowkeri Carruthers p. 51

1. A fragment of a water-worn rhizome, side view, with petioles sectioned (by abrasion) irregularly and more or less obliquely. Two petioles show the crescentic vascular bundle (*v*). Sections through adventitious roots can be seen between the petioles. ×1·5. V.29630.

2. The same showing the transverse section as exposed by fracture and abrasion. The axis, petioles and the origin of some of the roots can be seen. Surrounding the central core of parenchyma (grey) is an interrupted cylinder of vascular bundles (white). From the interspaces between the bundles adventitious roots arise (short, white, radial strands). Beyond are the petioles (variously sectioned) embedded in parenchyma. Good crescentic vascular bundles (*v*) opening towards the axis are seen. ×1·5.

   Thanet Sands : Hampton shore, Swale Cliff, Herne Bay, Kent.

Pinus macrocephalus (Lindley & Hutton) p. 52

3. The cast of a cone with some of the scales lying in the position of growth showing their upper (inner) surfaces. ×1. V.29633.

4. Nine scales removed from the same cone showing the external surface. Scale (*x*) is not correctly oriented (cf. Fig. 5). ×1·5.

Fig.

5. The same cast with the scales removed showing the impression of their outer surfaces. ×1.

6. One of the scales from the under (outer) surface showing the apophysis (*a*). The apophysis is imperfect on the left. ×2·25.

7. The same scale, upper (inner) surface showing the impression of a seed-body (*b*) and the wing impression of two seeds (*w*,*w*). ×2·25.

8. Another scale, under surface. ×2·25.

9. The same, upper surface. The small size of the seed-body (*b*) suggests abortive seeds, the wings are long and narrow (*w*). × 2·25

   Thanet Sands: Bishopstone, Herne Bay, Kent.

10. Basal end of a typical silicified cone showing the smooth water-worn surface. The specimen has been broken off transversely. ×1. V.32225.

11. Transverse section of the same cone showing cone axis, seeds and scales (cf. Pl. 3, Fig. 12). ×1.

    Thanet Sands: Shore between Bishopstone Glen and Reculvers, Herne Bay, Kent.

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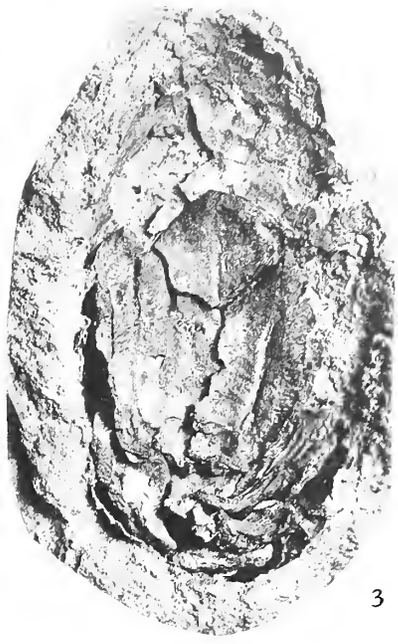

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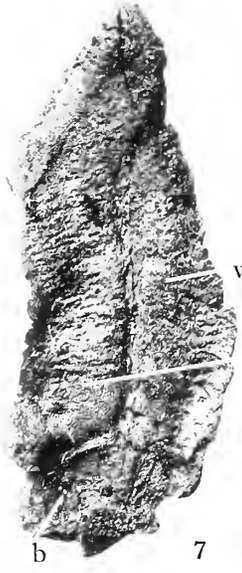

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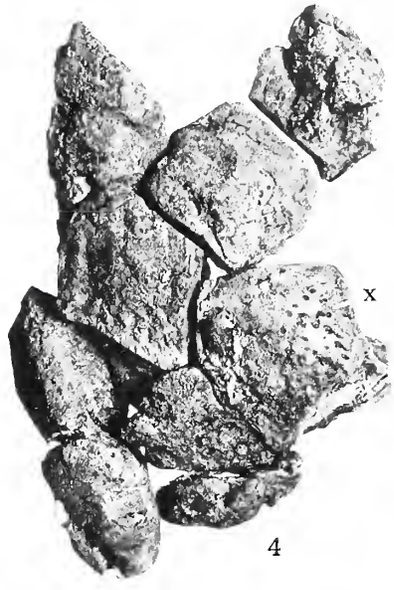

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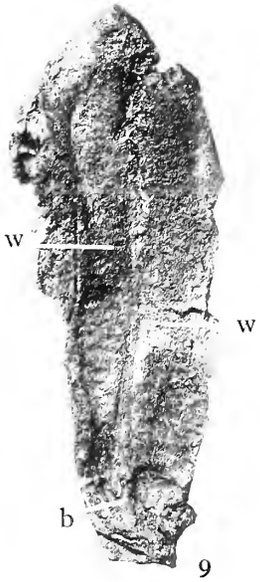

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OSMUNDITES, PINUS

Explanation of Plate 2

Fig.

Pinus macrocephalus (Lindley & Hutton) p.52

1. An almost perfect half cone, exterior. The smooth slightly convex apophyses of the scales meet so closely in a valvate manner that their margins are, in places, scarcely visible. some of the scales show irregularly scattered small circular pits connected with resin ducts. One scale (1) at the base is missing. The scale (6) remained adhering to the indurated sandy mould in which the cone was found. The largest scales are at the base of the cone. The two lowest scales preserved (2 and 3) are breaking away. Cf. Fig. 14 and Pl. 3, Fig. 1 for s_1, s_2, s_3. ×1·1. V.29631.

2. Scale (2) in Fig. 1, apophysis, showing the pits (resin canals) more clearly. The margin of the apophysis is broken at (1) on the left. The body (*b*) is scarcely visible as it is inclined almost at a right angle to the apophysis. ×1·8. V.29631*a*.

3. The same scale turned so as to expose the right lateral margin in Fig. 2. The base (*b*) is to the right. The scale and base are somewhat teredo-bored. The broad valvate margin is seen on the left. ×2·3.

4. The same scale, upper (ventral) surface showing the quadrangular form and teredo-boring at (*t*). ×2·3.

5. The apophysis of another scale (9) in Fig. 1 showing the pits (resin ducts) and pentagonal form. ×1·6. V.29631*b*.

6. Another scale, upper surface, with broad valvate edge (*v*,*v*) and the median longitudinal groove which marks the margins of the two wings. ×2·3. V.29631*c*.

7. Another scale, base only, upper surface. (*a*) is a channel which held the axis of the cone, (*c*,*c*) the cavities of its two seeds. ×2·2. V.29631*d*.

8. The same, lower surface. (*c*,*c*) are the cavities into which seeds borne by subjacent scales are fitted. Hence these cavities are at a lower level on the scale than those in which its own seeds lay (cf. Fig. 7). ×1·8.

9. Another scale, base only, lower surface. This is part of a broader, longer scale. (*c*,*c*) are the cavities associated with seeds of subjacent scales. ×2·3. V.29631*e*.

10. Profile of the base of another small scale. (*a*) is the point of attachment to the axis from which the scale springs at a wide angle. The upper part of the scale where it bends sharply upwards is broken away. ×2 approx. V.29631*f*.

Fig.

11. Basal and middle parts of another scale. The front of this with one of its seeds is seen at (*s*) in Fig. 14. One seed (*s*) from the scale below still adheres in one of the dorsal cavities. The other cavity (*c*) is empty. The apophysis of this scale is broken away. ×1·8. V.29631*g*.

12. Two scales, upper surface. The uppermost of the two (on the left of figure) is broken so that the apophysis and valvate margins have gone. The pair of winged seeds persist in the lower part of the scale (*s*). The wings (*w*,*w*) are seen (imperfect at the tip). The channel (*a*) embraced the cone axis. The lower of the two scales has its apophysis preserved and shows its valvate margins (*v*,*v*). One of its seeds is at (s_1). ×1·6. V.29631*h*.

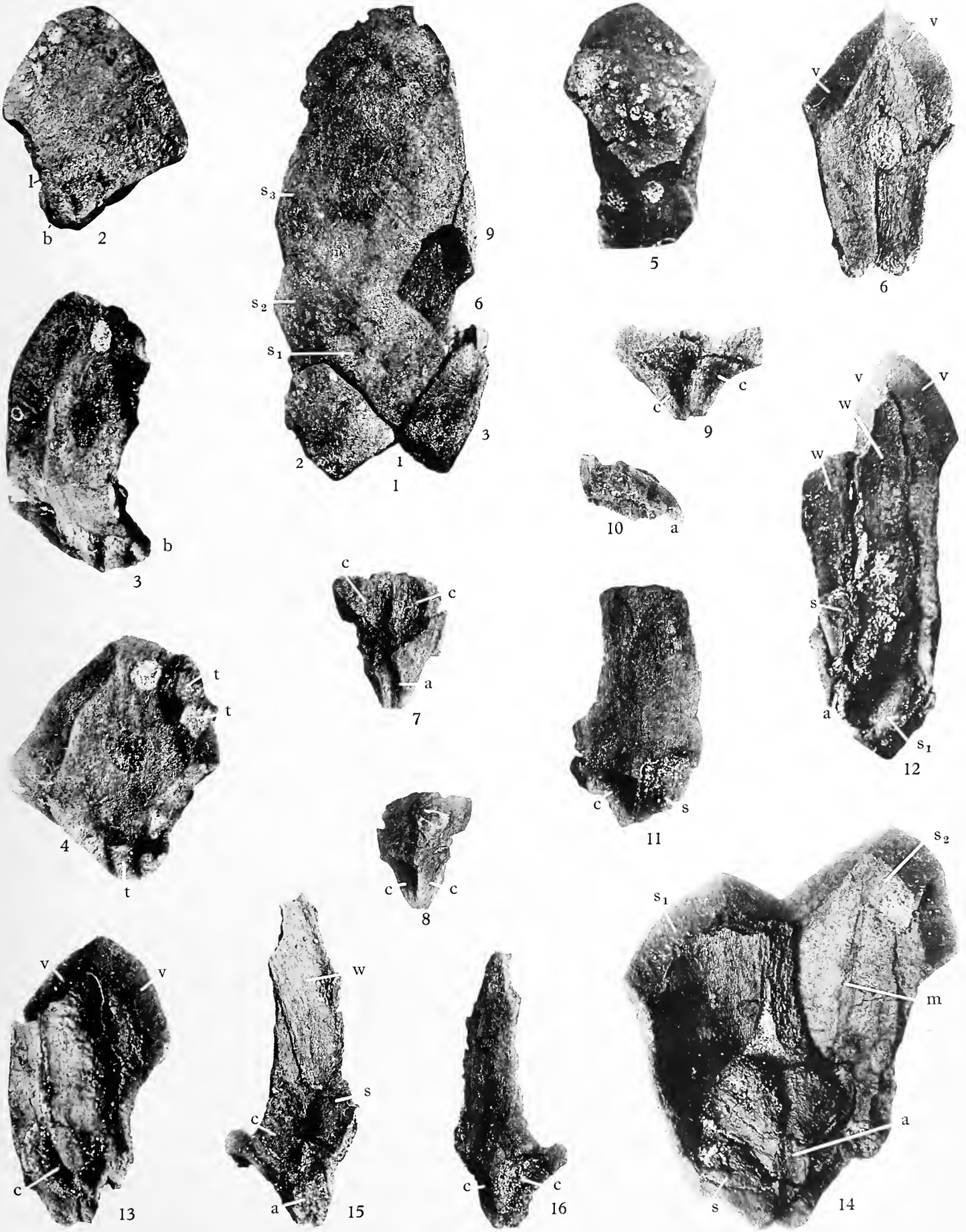
13. Two other scales in the same position. The uppermost (left) shows the wings but the seed-bodies have fallen exposing their cavities (*c*) on the upper surface of the scale (cf. Fig. 14, *s*). The lower scale to the right shows the valvate margin (*v*,*v*) but its basal end is broken. ×1·6. V.29631*i*.

14. Three or four detached scales, upper surface. The uppermost scales are broken at the distal end, the other two are complete and show the valvate margins. The perfect scale (s_1) shows a seed at (*s*). The back of this scale is seen in Fig. 11, and the front, with the seed-body gone and an overlying scale removed, in Fig. 13. The right hand scale (s_2) shows the median line (*m*) which indicates the adjacent inner margins of the two wings. The uppermost scale of all (broken on the right and above) still bears two seeds embraced and partially covered by wings, but above the right hand seed the wing and scale are both broken off short. (*a*) is the channel for the cone axis. The two scales are seen in Fig. 1 (s_1 and s_2). ×2·6. V.29631*b*,*g*,*i*-*k*.

15. An imperfect scale, upper surface, showing clearly a seed-body at (*s*), the cavity of another at (*c*), and part of the wing of the first seed at (*w*). The cone axis was at (*a*). ×2·2. V.29631*l*.

16. The same, dorsal surface, showing hollows (*c*,*c*) for the seeds on subjacent wings. ×1·8.

All the above from a single carbonaceous cone and its parts. Thanet Sands : Herne Bay, Kent.



PINUS MACROCEPHALUS

Explanation of Plate 3

Fig.

Pinus macrocephalus (Lindley & Hutton) p. 52

1. The cone, inner surface, as it appeared when still damp a few hours after it had been discovered. The lower part is much clogged with sand grains. Parts of seeds are seen at s_1 and s_2, showing their lower surfaces. Above the seed at s_1, the lower surface of the two wings are visible. The deep groove between seed-body and wing is emphasized by the presence of white sand grains. Other seeds are seen at s_3 and s_4. The attenuated scales and the thickened apophyses which gave a sharp outward curve to the contour of the scale are also seen. (*a*) is the cone axis much obscured by sand. ×1. V.29631.

2. The same, middle part. ×6·5. It shows a pair of seeds (s_2) in Fig. 1 (cf. Figs. 7, 8), and part of another seed. The lower surfaces of the wings are visible above the seeds. The rugose testa is clearly shown.

3. The same cone in longitudinal section as in Fig. 1 but with more scales removed from the near side so as to expose the axis for most of its length, also the point of origin of scales and seeds. A large terminal scale (several fused abortive scales?) is seen at *ap*. ×1.

4. A fertile seed from the middle of the cone, lower surface. It is the top left hand seed of the pair (s_1) in Fig. 1. (*m*) indicates the micropyle. ×6·5. V.29631*m*.

5. A somewhat distorted, less well-developed seed, broken above, showing the seed cavity. Micropyle at the base. ×6·5. V.29631*n*.

6. Another fertile seed, side view, showing marginal splitting. The upper surface is to the right. The micropyle (*m*) is at the base, (*f*) facet on lower surface. Top right hand seed of the pair (s_1) in Fig. 1. ×6·5. V.29631*o*.

7. Another fertile seed, lower surface, tilted a little to the left to show marginal splitting on the right. This is the right hand seed of the pair (s_2) in Fig. 1. Micropyle at the base (*m*). ×6·5. V.29631*p*.

Fig.

8. Another fertile seed, lower surface. It and Fig. 4 show the ill-defined facetting on the surface extending just below the middle of the seed. This is the left hand seed of the group (s_2) in Fig. 1. (*m*) is the micropyle. ×6·5. V.29631*q*.

9. One valve of a seed which has split marginally showing the smooth inner surface and thickness of the testa. Testa fractured irregularly below on the right. Micropyle at (*m*). ×6·5. V.29631*r*.

10. The same, outer surface. ×6·5.

11. Part of a seed, showing the cavity. Incipient marginal splitting is indicated by the dark line on the right. The striation of the inner surface (obscurely seen) is clearly visible in the specimen itself. ×6·5. V.29631*s*.

    All the above from the single carbonaceous cone and its parts (see also Pl. 2). Thanet Sands: Herne Bay, Kent.

12. The middle part of a large cone (transverse section as displayed at the lower end of the silicified fragment). The axis is seen at the centre but is too worn to display much structure. Ten seeds are visible. One at (*ts*) is in longitudinal section and shows a thick rugose testa surrounding a white calcite seed-cast. At (*ec*) is the external impression of the rugose testa of another seed. The impression is on a film of silica which occupies the hollow in the scale which overlay this seed-body. (*ic*) is an internal cast of another seed showing the form. (e_1, e_2, e_3) are external impressions of rugose seed-bodies. The ring of small dots outside and above the ring of seeds in the figure and around the cone axis represents casts of resin cavities or ducts in the cone-scales and in the cortex of the axis. The whole specimen is much waterworn. ×1·5. V.29632.

    Presumed to come from Thanet Sands: Shore, Herne Bay, Kent.

PINUS MACROCEPHALUS

Explanation of Plate 4

Fig.

Pinus prestwichi Gardner p. 56

1. Neotype. Cone lying in glauconitic sandy concretion. It shows well-preserved apophyses. ×1. V.32110.

2. Central part of the same cone with a few scales removed showing the impressions of seeds and their wings on the lower surface of the scales which overlay them. (*s*) unripe seed (hollow impression). ×3.

3. Seed which was overlain by the hollow impression (*s*) in Fig. 2. The wing is broken. ×6·5.

4. Tip of a scale (*x* in Fig. 1), upper surface, from the same cone showing impression of wing tips. ×3.

5. Lower part of the same cone with natural longitudinal fracture showing the origin of scales from axis. ×2·8.

6. Carbonaceous cone lying in a ferruginous concretion. ×1. V.32109.

7. The same to show details of the apophyses. ×2·8.

   Thanet Sands: Bishopstone Glen, Herne Bay, Kent.

Sequoia couttsiae Heer p. 60

8. A seed imperfect at the tip and side but showing the seed-body and wings. ×15. V.29634.

Fig.

9. The opposite side of the same seed showing the oval scar of attachment (*sc*). The apex is cut off by the edge of the photographic plate. ×15.

   Derivative (Reading Beds?): Hedge Lane, Lea Valley, Middlesex.

Caricoidea obovata n.sp. p. 62

10. Holotype. A utricle showing longitudinal fibres. ×20. V.29635.

11. Another utricle. ×9. V.29636.

12. A utricle broken below, abraded above. ×20. V.29637.

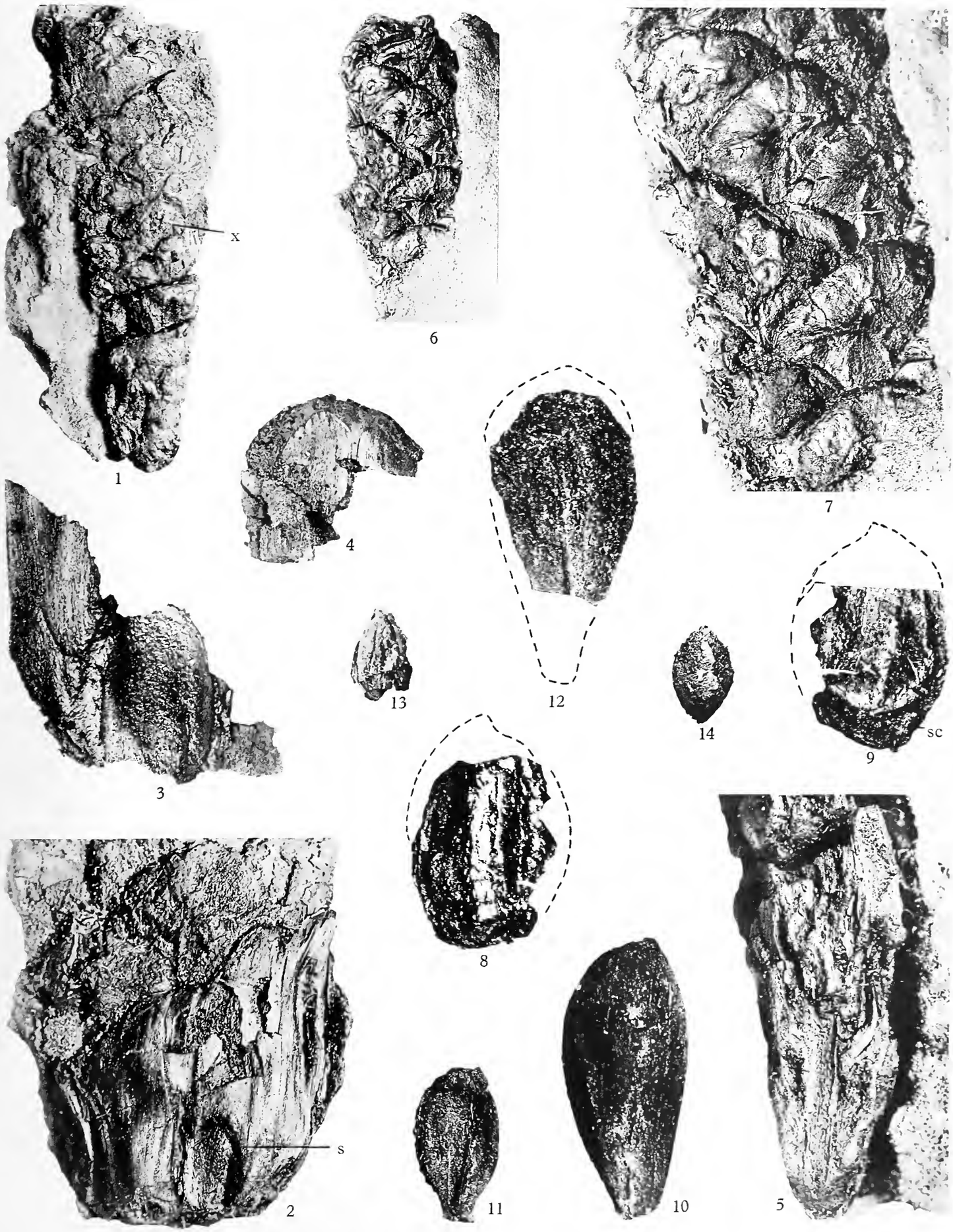
13. A utricle broken below. The inner surface, exposed by fracture, shows the cells of the locule-lining in the actual specimen. ×9. V.29638.

    Woolwich Beds IV: City & S. London Tube Extension, Tooting Broadway, Surrey.

Carpolithus sp. p. 92

14. A plug or embryotega of a seed or possibly a small lozenge-shaped seed. ×19. V.30584.

    Woolwich Beds IV: City & S. London Tube Extension, Tooting Broadway, Surrey.



PINUS, SEQUOIA, CARICOIDEA

Explanation of Plate 5

Fig.

Carpinus davisi n.sp. p. 63

1. Holotype. Fruit with remains of broken bract (*b*) forming a frill at the base. ×19. V.29640.

2. The same, opposite surface. ×19.

3. Same as Fig. 1 showing ribs and frill more clearly. ×9.

Woolwich Beds IV: City & S. London Tube Extension, Tooting Broadway, Surrey.

Laurocarpum sp. p. 65

4. An actual berry lying within its external impression in the matrix. (*s*) is the impression of the scar of attachment. ×2·5. V.29641.

Woolwich Beds: Dulwich, Surrey.

Laurocarpum sp. p. 65

5. A berry lying in the matrix. It shows the extent of the large basal attachment scar (*s*). ×2·5. V.15504.

Woolwich Beds; Dulwich, Surrey.

Laurocarpum sp. p. 66

6. A berry detached from its peduncle or cupule with the endocarp projecting below at (*e*). ×2·75. V.29642.

7. Another berry broken at the base. ×2·75. V.29643.

Woolwich Beds IV: City & S. London Tube Extension, Tooting Broadway, Surrey.

Fig.

Laurocarpum sp. p. 66

8. Two detached berries lying side by side (one upside down) represented by impressions in the matrix. They show the large scar of attachment (*s*). ×1·8. V.15476.

9. A third berry which shows particularly clearly the curved longitudinal ridges on the impression. The small twig has no connexion with this berry. (*s*) as above. ×1·8. V.15475.

10. A twig with three attached berries lying in their cupules (*c*). A pair of stipules or bracts are seen at (*st*). ×1·8. V.3595.

11. Another twig with two attached berries. ×1·8. V.15463.

Reading Beds: Railway cutting, near Reading, Berkshire.

Liquidambar palaeocenica n.sp. p. 67

12. Holotype. Impression of a fruit with locule-casts (*l*). ×2·75. V.15361.

13. The best preserved locule-cast in Fig. 12 showing its base. The apex is buried in the matrix. ×18·75.

14, 15. Counterpart impressions of another fruit showing the long awns. Areoles in which the fruitlets lie are obscurely indicated in Fig 14. ×2·75. V.15360.

16. Part of Fig. 15 (indicated by arrow) showing the awns. ×10.

17. A small head, male or immature female?. Awns absent? Areoles visible . ×2·75. V.15359.

Reading Beds: Reading, Berkshire.

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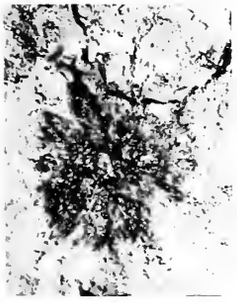
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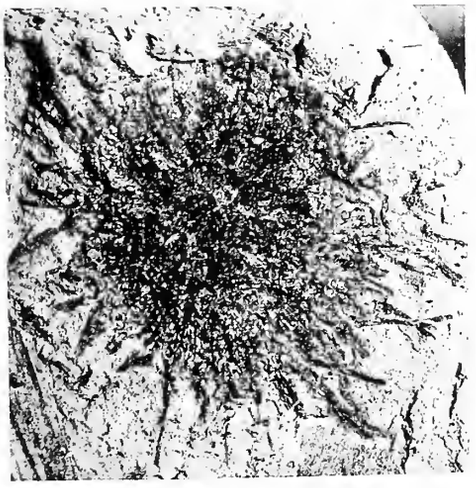
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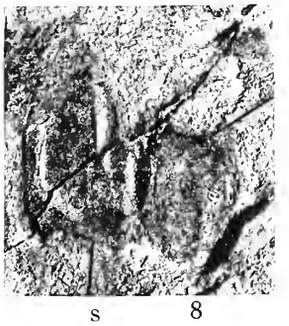

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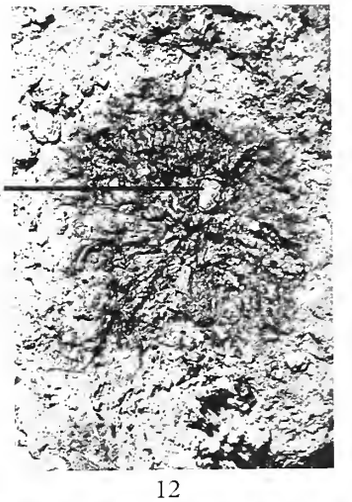

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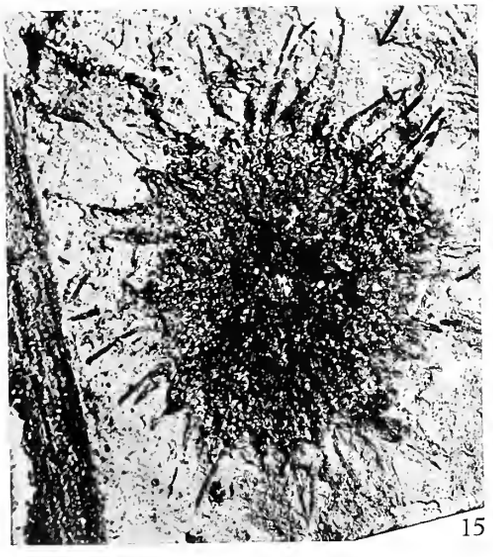
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CARPINUS, LAUROCARPUM, LIQUIDAMBAR

Explanation of Plate 6

Fig.

Liquidambar palaeocenica n.sp. p. 67

1. A composite fruit with crushed areoles and fruitlets in section represented by carbonaceous remains. ×2·75. V.15357.

2. The same, part of the margin, to show the long tapering awns. ×10.

3. A fruiting head or composite fruit with a carbonaceous core which at first sight suggests *Platanus*. ×2·75. V.15358.

   Reading Beds: Reading, Berkshire.

Family Hamamelidaceae? Genus? p. 70

4. An ovate leaf also figured by Hooker (1854, pl. 4, fig. 1). The three stoutest primary nerves are clearly seen, a secondary nerve arising from the middle primary and forming a loop is obscurely seen on the left. The nervation as revealed by close scrutiny of the specimen is indicated in Text-fig. 2A. The cordate base (petiole broken away) is visible. Teeth are seen on parts of the margin. ×1. V.15463.

Fig.

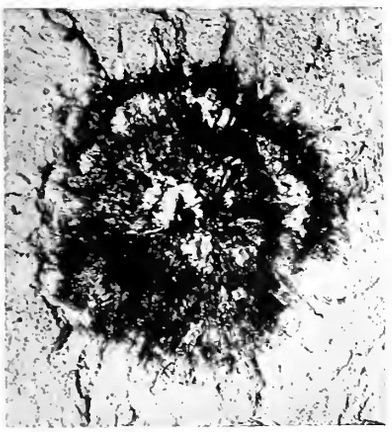
5. A leaf with well-preserved teeth and acuminate apex. Looping of secondary nerves is obscurely seen on the right. ×1. V.15297.

6. A leaf impression on the same slab as Fig. 4. The nerves are more clearly seen because the specimen was only lately uncovered by removal of a thin flake. Some lobing at the apex may be indicated but the margin is not complete there. Looping of the nerves is suggested by the way in which they converge, and is actually seen on the left. Seven primary nerves arise from the base. A coarsely toothed part of the margin is preserved on the left at (*m*). ×1·25.

7. The right hand side of a torn leaf showing marginal teeth and looping of the nerves. The midrib is twisted out of position near the leaf base. ×2·5. V.15336.

8. A broad twig with ?stipule (*st*) on the left, which may cover a composite flowering head (impressed through the stipule and showing as a triangular region delimited by a row of circular bodies). ×1·5. V.15463.

   Reading Beds: Railway cutting, Reading, Berkshire.



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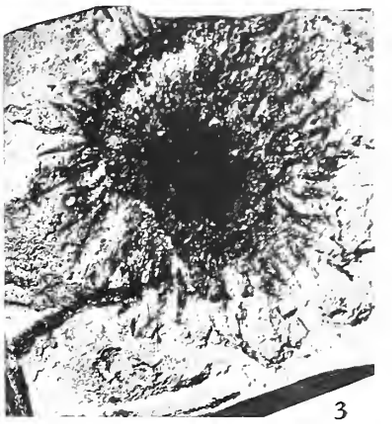

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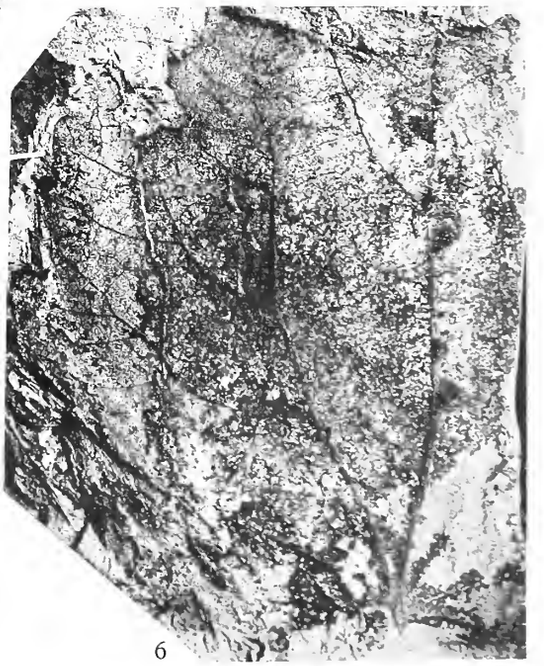

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LIQUIDAMBAR, HAMAMELIDACEAE (?) GENUS (?)

Explanation of Plate 7

Fig.

Leguminosites gardneri n.sp. p. 72

1. Holotype. A raceme with several pods showing the form, persistent calyx, and flanged stem. ×1·6. V.15340.

2. A pod from Fig. 1. (*c*).=calyx. ×2·85.

3. Another specimen of a pod. ×2·85. V.15348.

4. Two opposite pods hanging from the same point of an axis. × 2 approx. V.15344.

5. Two pods hanging from an axis which shows circular bundle-scars. ×2. V.15341.

Reading Beds: Reading, Berkshire.

Leguminosites sp. p. 73

6. Elongate pod incomplete at both ends. ×1·5. V.15339.

7, 8. Counterpart impressions of a second pod complete at one end only. ×1·5. V.15338.

Reading Beds: Reading, Berkshire.

Leguminosae (Caesalpinoideae). Genus? p. 74

9. A carbonaceous seed. ×6·5. V.29647.

Woolwich Beds: Bognor, Sussex.

Fig.

Phellodendron costatum Chandler p. 75

10. External cast of a seed (dorsal) showing the longitudinal ribs, sub-apical constriction, and convergence of ribs towards the basal chalaza. ×20. V.15361*a*.

11. External cast of same seed (ventral) showing part of the strap-shaped hilar scar (*h*) and ridges diverging from it. ×20.

Reading Beds: Reading, Berkshire.

Anarcardiaceae (**Rhus**? or **Pistacia**?) p. 75

12, 13. Opposite sides of a crushed carbonaceous endocarp with large basal oval attachment scar (*a*). The endocarp is broken on one side just below the apex at (*b*). ×6·6. V.29648.

Derivative (probably from Reading Beds): Broxbourne, Hertfordshire.

Natsiatum eocenicum Chandler p. 76

14, 15. Opposite sides of a crushed carbonaceous endocarp showing marginal rim at base (*r*) and sub-apical thickening (*t*) over the placenta. (*f*) shows the position of the funicle, (*st*) marks the style. ×6·6. V.29649.

Derivative (probably from Reading Beds): Broxbourne, Hertfordshire.

16, 17. Opposite sides of a broken endocarp, basal end, the actual base is broken away and one margin is missing. ×6·6. V.29651.

Woolwich Beds IV: Tooting Broadway, Surrey.


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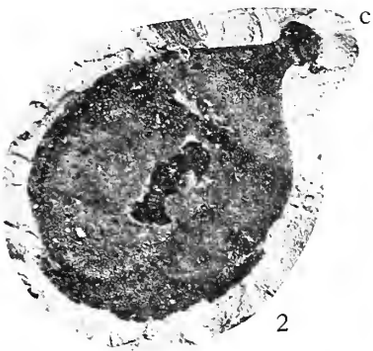

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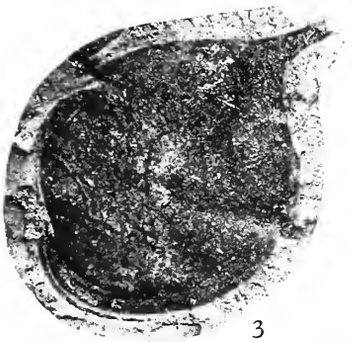
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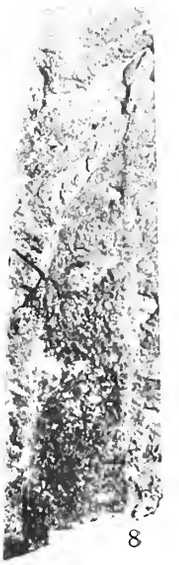
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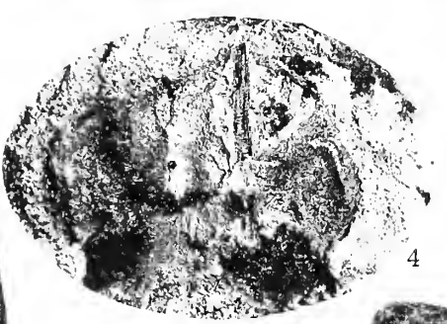
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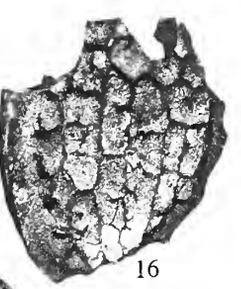
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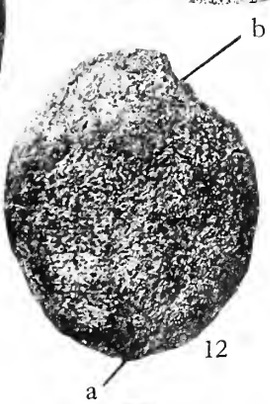

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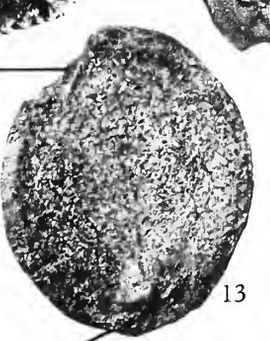

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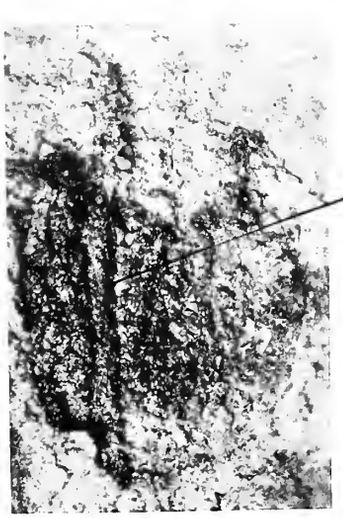

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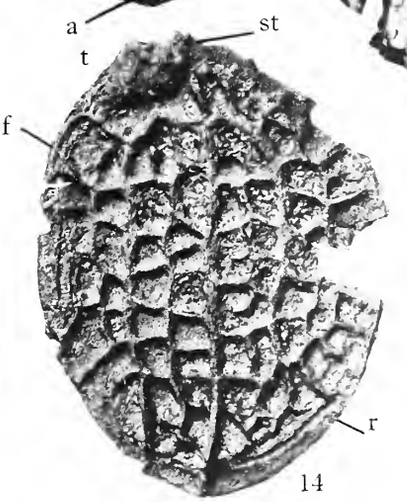

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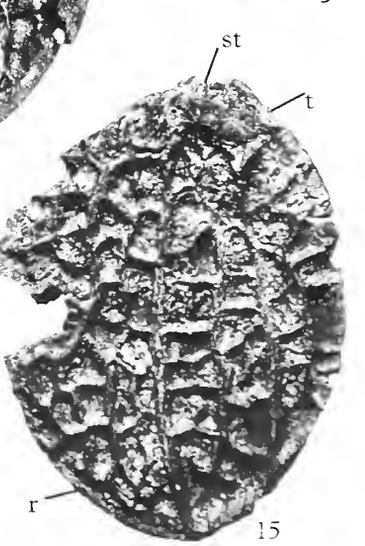

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LEGUMINOSITES, LEGUMINOSAE GENUS (?), PHELLODENDRON, ANACARDIACEAE, NATSIATUM

Explanation of Plate 8

Fig.

? **Oncoba variabilis** (Bowerbank) p. 78

1. Fruit, external impression showing stalk, perianth and segments or valves. Style broken above. ×2 approx. V.15353.

2. External impression with style (*st*) and stalk. The impression is filled by the crushed placental mass. Parietal placentas associated with longitudinal fibre strands can be seen on the actual specimen at *pl*. ×1·5. V.15351.

3. Another external impression, broken at the apex, stalk well preserved. Valves of the fruit are splitting apart. ×2. V.15352.

4. External cast of a seed probably of this species. ×20. V.15339*a*.

5. Internal cast of the same seed. Transverse fibres of one of the inner coats are seen at *f*. ×18·75.

Reading Beds: Reading, Berkshire.

Vitis pygmaea? p. 78

6. A crushed seed, dorsilateral aspect showing the chalaza (*ch*) and one ventral infold (cf. Text fig. 3A, p. 78). ×6·6. V.29652.

7. The same, opposite side (ventrilateral aspect showing raphe-ridge *r*, right hand margin) and the other ventral infold (cf. Text-fig. 3B, p. 78). ×6·6.

Woolwich Beds IV: Tooting Broadway, Surrey.

Myrtospermum variabile Chandler p. 80

8, 9. A crushed seed, opposite sides (hilum at *h*; micropyle at *m*). ×19. V.29653.
Woolwich Beds IV: Tooting Broadway, Surrey.

Myrtospermum warreni n.sp. p. 81

10, 11. Holotype. A seed, opposite sides (hilum at *h*; micropyle at *m*). ×15. V.29654.
Derivative (probably from Reading Beds): Ponders End, Lea Valley, Middlesex.

Myrtaceae ? Genus ? p. 81

12. A rounded-triangular seed. ×19. V.29655.

13. A broader seed showing surface striations. ×19. V.29656.
In both *h*=hilum, *m*=micropyle.
Woolwich Beds IV: Tooting Broadway, Surrey.

Fig.

?**Apocynospermum lakense** n.sp. p. 82

14, 15. Two fragments of a pitted seed. ×15. V.29660.
Derivative (probably from Reading Beds): Broxbourne, Hertfordshire.

Abelia palaeocenica n.sp. p. 83

16. Holotype. Impression of the lower surface of the wings of a fruit. ×6·6. The white patch in the lower left hand corner is a shell. The body is below the base of the figure. V.19148.

Woolwich Beds: Beddington, Surrey.

Sambucus sp. p. 84

17. An external impression of a seed showing the distinctive rippling of the surface. ×20.

Reading Beds: Reading, Berkshire.

Jenkinsella apocynoides Reid & Chandler p. 84

18. An external impression of the fruit with remains of carbonaceous carpel (much crushed) showing the longitudinal fibres diverging slightly obliquely from the ventral suture. ×2·7. 41185.

Woolwich Beds: Dulwich, Surrey.

19. Another external impression (imperfect) showing longitudinal fibres. ×2·5. V.15354.

20. An internal cast, ventral side, showing the suture (*s*) and placentae. One end of the cast is embedded in matrix. × 2·7. V.15355.

Reading Beds: Reading, Berkshire.

Carpolithus spp. p. 90

21. A small stalked pod. ×2·85. V.15356.

Reading Beds: Reading, Berkshire.

22. A seed, represented by the tegmen with rounded chalaza (*ch*) at one end, micropyle (*m*) at the other. ×2. V.15504*a*.

Woolwich Beds: Dulwich, Surrey

23. One end of an ovoid seed with a few tubercles perhaps over the chalaza (*ch*). ×19. V.29659.

Woolwich Beds IV: Tooting Broadway, Surrey.

An undetermined coriaceous leaf p. 90

24. The impression of a thick coriaceous pinnate leaf with entire margin (broken at the tip). ×2. V.15336.

Reading Beds: Reading, Berkshire.


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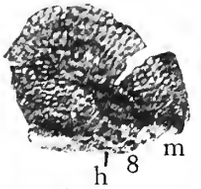

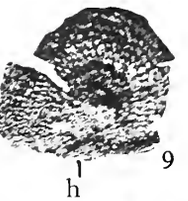


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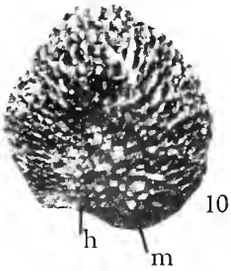

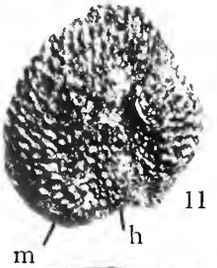


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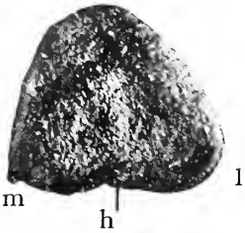

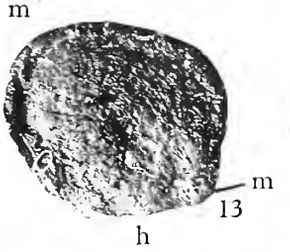

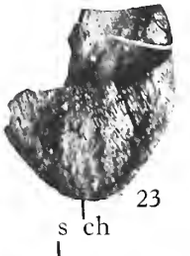


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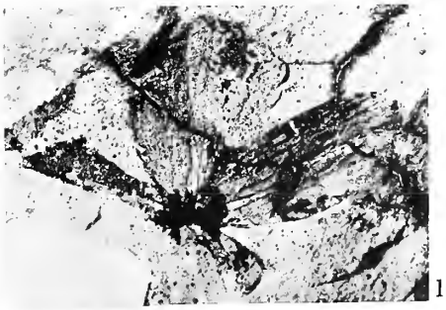
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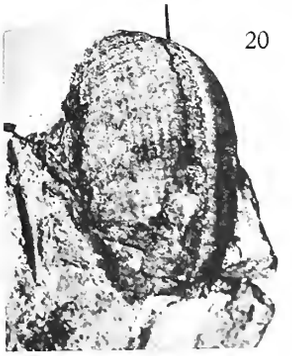
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ONCOBA, VITIS, MYRTOSPERMUM, MYRTACEAE (?) GENUS (?),
APOCYNOSPERMUM, ABELIA, SAMBUCUS, JENKINSELLA, CARPOLITHUS

Explanation of Plate 9

Fig.

Carpolithus gardneri n.sp. p. 85

1. Holotype. A raceme showing several fruits some severed from the stem. Fruits 2 and 5 are internal casts, 1, 4 and 6 are in part external casts. *n* is a node. ×1·1. V.15336.

2. Part of the counterpart of V.15336. Fruits 4 and 5 are represented by external impressions. Fruit 9 (an internal cast) can no longer be seen in V.15336 as it lay at a slightly higher plane and was evidently removed when the original development of the block took place. Its position in the raceme is shown in Text-fig. 4A (dotted). ×2. V.15337.

3. Fruit 2 in Fig. 1. ×2·66.

4. Counterpart of the lower part of specimen V.15336. *n* the node in Fig. 1, and *y* the branch. Whorls of scars (fallen leaves?) are indicated by *w*. ×2·3. V.15335.

5. Part of the external impression of a severed fruit on V.15336. It lies outside the picture to the right in Fig.1. The suture line is clearly seen. ×2·5.

Carpolithus sp. p. 91

6. An impression of a seed or pod. On the right at *f* is seen an impression which may be a hook-like funicle (cf. the retinaculum of Acanthaceae) but without further material it is not certain that this object is really organically connected with the main impression. ×2·5. V.15350.
All the above Reading Beds: Reading, Berkshire.

Carpolithus sp. p. 92

7. An incomplete chitinous net-like sac. ×6·5. V.40999.
Derivative (probably from Reading Beds): Broxbourne, Hertfordshire.

Limnocarpus cooperi n.sp. p. 93

8. Holotype. External cast of an endocarp showing the apical style (*st*) and oblique foramen (*f*), side view, ×15. V.29662.

9. Internal cast of same endocarp showing attachment (*a*), curved form, and two limbs. Side view. ×15.

10. Same internal cast, ventral view, showing the gap between the limbs, and style (*st*). ×15.

Limnocarpus sp. p. 94

11. Endocarp represented by a locule-cast and carbonaceous remains, side view. ×15 approx. V.29670.

Fig.

Limnocarpus(?) magnus n.sp. p. 94

12. Holotype. An endocarp lying in matrix abraded so as to expose the locule-cast and in parts the seed-cast. Side view. Style (*st*) and germination valve (*v*) are clearly seen ×6·5. V.29671.

13. Another locule-cast, side view, showing the curved form and gap between the limbs. *st*=style. Germination valve missing which makes the cast appear relatively narrow. ×6·5. V.29672.

14. Part of an external cast of an endocarp, dorsal side, showing the impression of the ridged germination valve (incomplete below). *st*=style. The valve is gaping above at *v*. ×6·5. V.29673.

15. The internal cast of the same endocarp, dorsal view, showing the lower half of the valve which is incomplete above. ×6·5.

Canticocculus cooperi n.gen. & sp. p.95

16. Holotype. External cast of an endocarp showing the inflated marginal area which encloses the locule. It embraces a flattened depressed area. Stylar limb to the right, the angled ventral margin to the base. Radial ridges ornamenting the marginal area can be seen. ×6·5. V.29675.

17. A fragment of the carbonaceous endocarp out of the above cast showing the stylar limb and radial ridges over the locule. *m*=part of the flattened depressed median area. ×15.

18. The reverse side of the same fragment showing the locule inside the stylar limb. ×15.

19, 20. Outside and inside of another fragment of the same endocarp. In Fig. 19 the elongate foramen (*f*) can be seen but one margin is broken and the upper end is incomplete. The lower extremity of the stylar limb is preserved (*st*). Fig. 20 shows the foramen (*f*) from the inside, also the tip of the stylar limb (on the right) and a very small bit of the other limb (on the left). ×15.

Menispermaceae (Cocculinae). Genus? p. 96

21. Part of an endocarp and its internal cast lying in the matrix. *st*=stylar limb, *a*=attachment. ×15. V.29676.

Figs. 8–21 Oldhaven Beds: Bishopstone, Herne Bay, Kent.

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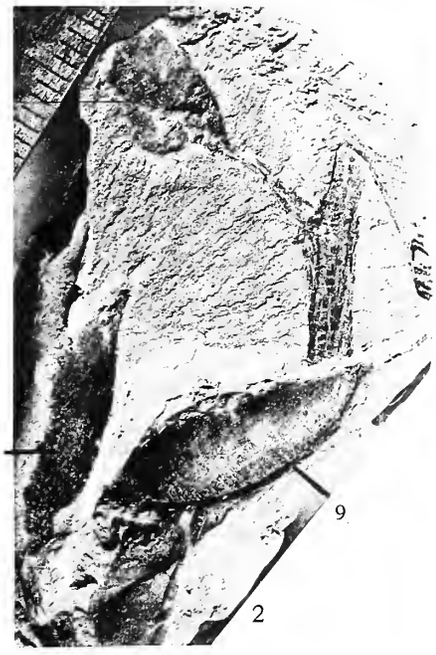

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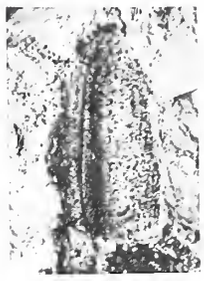
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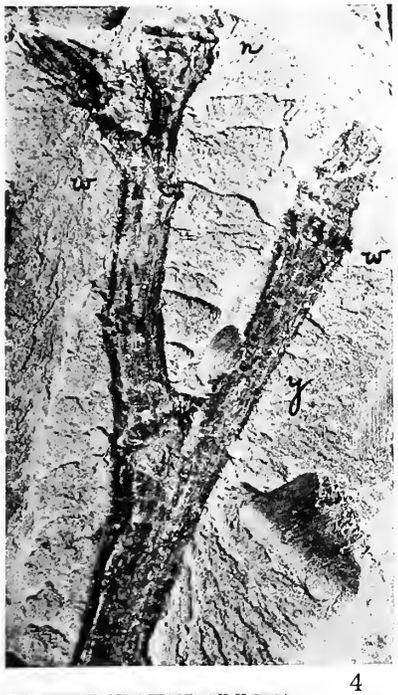

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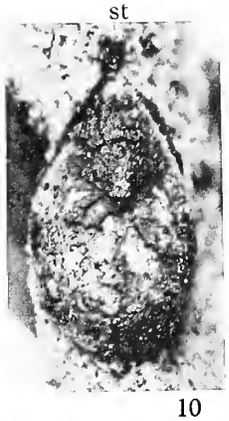

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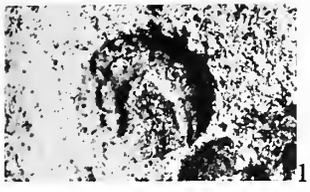
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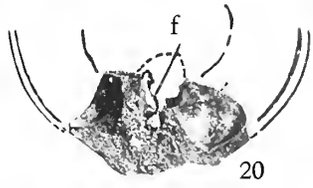

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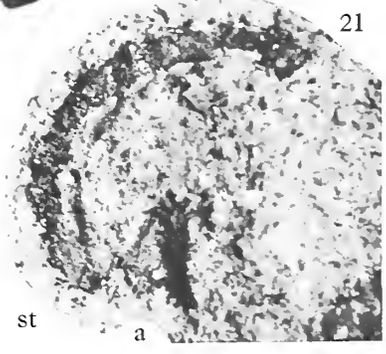

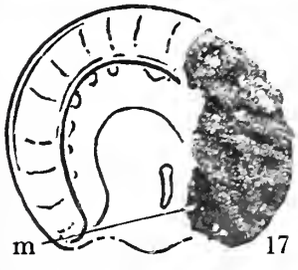

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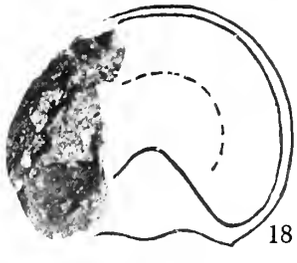
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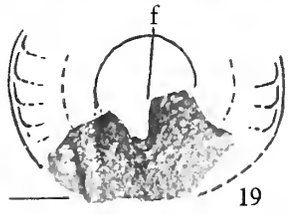

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CARPOLITHUS, LIMNOCARPUS, CANTICOCCULUS, COCCULINAE GENUS (?)

Explanation of Plate 10

Fig.

Menispermaceae (Cocculinae). Genus? p.96

1. Part of the marginal area of a horse-shoe shaped endocarp showing lateral horse-shoe shaped ridge and transverse ridges which arise on its outer side and end abruptly between it and the margin. External impression. ×15. V.29677.

2. The imperfect endocarp itself belonging to the impression in Fig. 1, but showing opposite surface. ×15.

3. The same, tilted on to its ventral edge so as to display the median ridge (*m*), and the transverse ridges (*tr*) on each side of it forming projections as seen in profile at the top of the figure. ×15.

Menispermicarpum serratum n.sp. p. 97

(A restoration of this specimen is attempted in Text-fig. 8. Figs. 4–9 are all parts of a single specimen).

4. Holotype. Incomplete internal cast showing the angled marginal horse-shoe shaped locule (reproducing also the shape of the seed). ×15. V.29681.

5. A fragment tilted so as to show the ventral angle (*a*) of the locule and seed-cast. ×15.

6. The external cast of part of the dorsal margin. The median ridge lies along the left hand side (line marked *m———m*). One lateral edge is on the right. All to the left of the median ridge is missing. Impressions of transverse laminae between median ridge and lateral edge are seen. (cf. Text-figs. 8B,C. ×15.

7. External cast of one lateral depression (lying between the arms of the horse-shoe shaped locule) showing marginal flutings which correspond with the serrations of the lateral flanges of the locule area. The cast is incomplete at its lower end as indicated by lines continuing the direction of its edges. ×15.

8. Section through locule-cast (*rlc*) so as to expose the actual carbonaceous surfaces of the recurved lateral serrated flanges (*rlf*) of the endocarp (cf. Text-fig. 8B). Transverse ridges between the median and lateral flanges are indicated on a fragment of external cast at (*ec*). ×15.

9. Section through endocarp passing through the two lateral hollows (*lh*, *lh*), the locule (*l*), and the median and lateral flanges (*f*,*f*,*f*). ×15.

Tinospora excavata Reid & Chandler p. 98

10. Ventral aspect of an imperfect internal cast of an endocarp showing the stylar end and part of the ventral hollow. ×6·5. V.29682.

11. The same cast, lateral aspect. (*v*) is the ventral side. ×6·5.

12. The same looking on to the apical or stylar end. The base of the style is at (*st*). ×6·5.

Fig.

13. A fragment of an external cast of the same specimen showing pits which represent tubercles on the original carbonaceous endocarp. ×6·5.

Laurocarpum (**Cinnamomum**?) sp. p.99

14. A crushed endocarp lying in matrix. (*f*) may mark the foramen for the funicle. The actual substance of exocarp and endocarp are seen in section. Over most of the surface of the specimen the locule-cast (or in some places the seed-cast) is exposed. × 6·5. V.29683.

Laurocarpum sp. p. 100

15. A locule-cast showing the transverse funicular opening (*f*), side view. A transverse constriction (*ch*) marks the edge of the chalaza which occupies the lower half of the cast. ×6·5. V.29684.

16. Ventral aspect of the same showing the two cotyledons (junction at *p*). (*f*), (*ch*) as above. ×6·5.

17. Dorsal aspect of same with raphe angle. The limits of the chalaza lie at *ch*. ×6·5.

Laurocarpum sp. p. 100

18. Remains of an ovoid berry. ×2·5. V.29685.

Zanthoxylon sp. p. 100

19. A seed, side view. The hilum (*h*) lies to the left. The testa is broken on the right so that the tegmen is exposed. × 6·5 V.29693.

20. A fragment of the same seed split along the raphe (*r*). ×15.

21. Another part of the seed. Looking into the seed-cavity. The circular aperture of the basal chalaza (*ch*) is clear. ×15.

Euphorbiaceae. Genus? p. 101

22. Two locule-casts of a multilocular fruit which has split septicidally. The casts surrounded by carbonaceous remains of the fruit lie embedded in matrix. The central axis is indicated along the line (*a———a*), its apex is somewhat above the middle of the fruit at (*ap*). A stout fibre traverses the septum diagonally from the top of the axis to (*f*) on the surface of the fruit. ×6·5. V.29694.

Natsiatum eocenicum Chandler p. 102

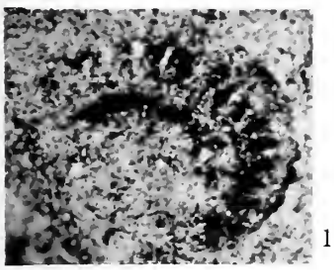
23. External cast of endocarp, imperfect below. ×2·8· V.29686.

24. The actual endocarp more or less abraded so that the sharpness of the ridges is somewhat diminished. It encloses the locule-cast. ×2·8.

25. The same. ×6·5.

26. External cast of another endocarp. ×2·8. V.29687.

All the above from Oldhaven Beds: Bishopstone, Herne Bay, Kent.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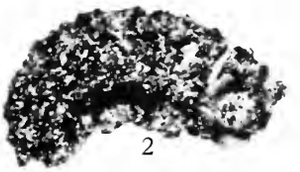
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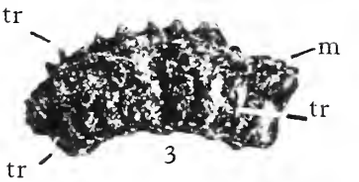

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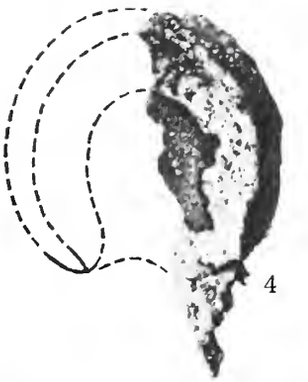
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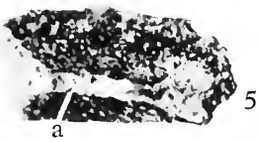

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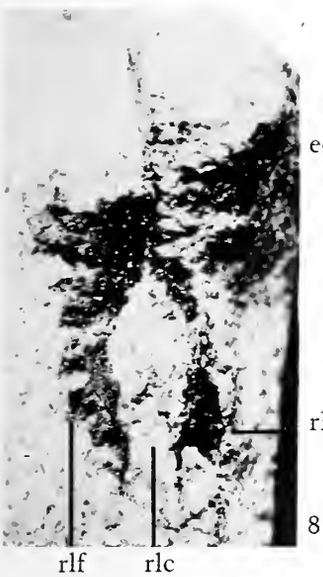

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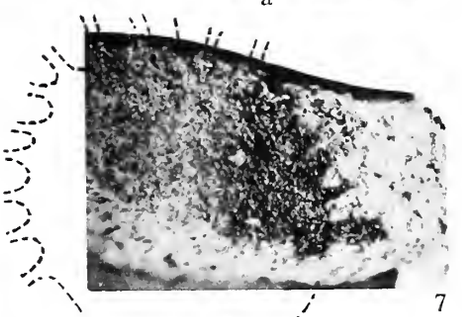

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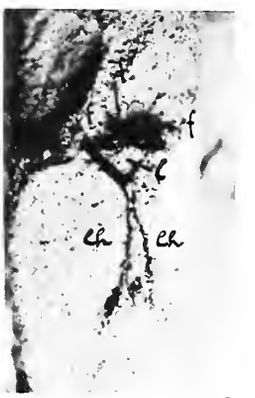

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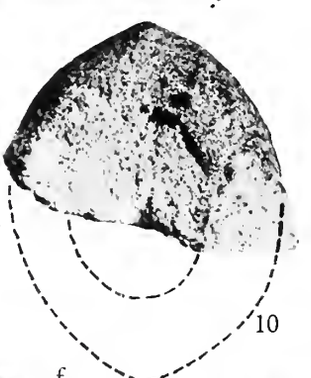
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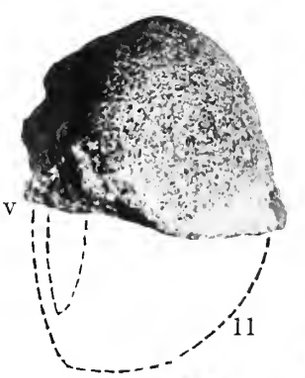

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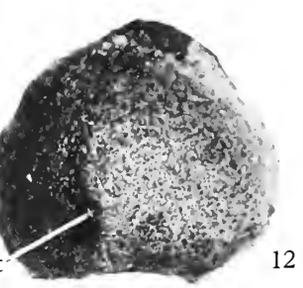

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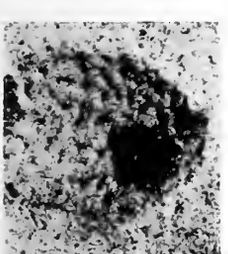
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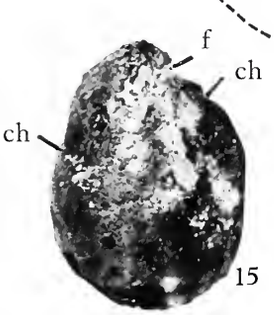

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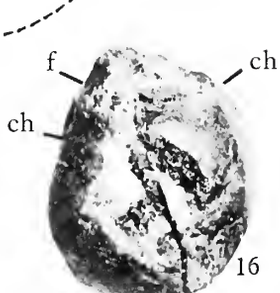

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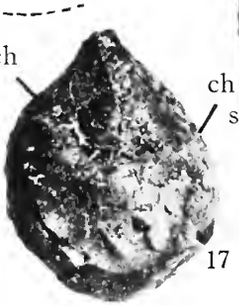

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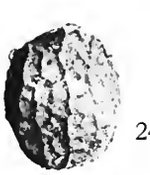
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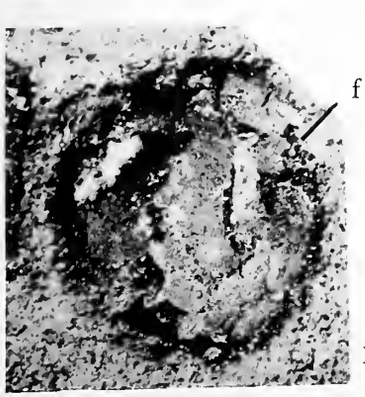

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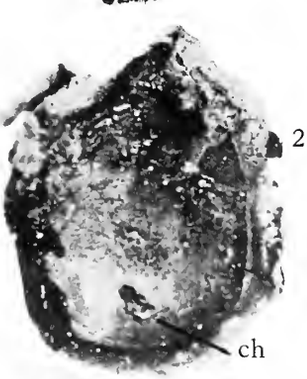

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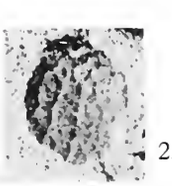
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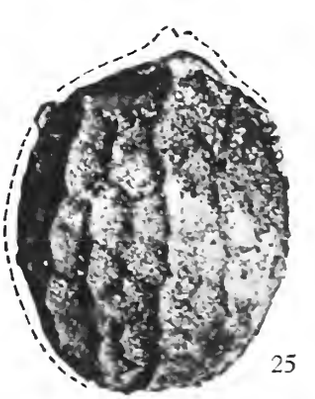
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COCCULINAE GENUS (?), MENISPERMICARPUM, TINOSPORA, LAUROCARPUM, ZANTHOXYLON, EUPHORBIACEAE GENUS (?), NATSIATUM

Explanation of Plate 11

Fig.

Rhamnaceae. Genus? p. 102

1. Tegmen lying in testa. The nearer side of the testa towards the observer was removed. *ch*=chalaza scar, *m*=micropyle. ×15. (cf. Text-fig. 9A). V.29695.

2. Interior of part of the testa which was removed. Margin perfect on the left. ×15.

3. Exterior of the same fragment of testa. ×15.

4. Testa as in Fig. 1 (though slightly more broken) after removal of tegmen. The large chalazal aperture is clearly shown at (*a*). Much of the margin is broken (cf. Text-fig. 9B). ×15.

5. The same as Fig. 4 but with a fragment on the left broken away so as to expose the large chalazal cavity (*cc*) below the aperture (*a*). Cf. Text-fig. 9C. ×15.

Vitis sp. p. 104

6. Seed, external cast of ventral surface. ×6·5. V.29696.

7. Internal cast of another seed in calcite, broken at the extreme hilar end. Ventral surface showing unequal facets and ventral infolds. ×6·5. V.29697.

7*a*. Diagram to explain Fig. 7.

8. The same as Fig. 7. Dorsal surface showing oval chalaza. ×6·5.

8*a*. Diagram to explain Fig. 8.

Vitis sp. (**V. obovoidea**?) p. 105

9. External cast of a seed, ventral side. ×6·5. V.29690.

10. External cast of a seed, dorsal side (incomplete). ×6·5.

Vitis sp. p. 106

11. Internal calcite cast of seed lying in matrix. The cast is broken on the dorsal side and shows the inner surface of the ventral infolds projecting into it. ×6·5. V.29699.

Vitis sp. p. 106

12. Internal cast of the dorsal side of a seed, basal end, showing the internal chalaza. ×6·5. V.29700.

Myrtospermum cooperi n.sp. p. 106

13. Holotype. A seed fractured longitudinally lying in the matrix. It shows the curved cavity and the condyle separating the two limbs. ×15. V.29701.

Fig.

14. The same with part of the carbonaceous seed removed so as to show the external cast with characteristic coarse divergent cells. ×15.

15. The internal cast of the same seed showing the curved form. The micropylar limb is broken at the tip, the chalazal limb is perfect. *ch*=chalaza. ×15.

16. The external cast of another seed showing coarse cells in places. ×15. V.29702.

17. Another carbonaceous seed lying in the matrix. Casts of the coarse testa cells are seen around the circumference of the seed. ×15. V.29703.

Myrtospermum variabile Chandler p. 108

18. A valve of a seed lying in the matrix containing the internal cast. It shows the curved cavity and narrow condyle between the two limbs. *m*=the micropylar limb, *h*= the hilum. The thickness of the testa shows in the photograph at (*t*) . ×15. V.29705.

Myrtospermum sp. p. 108

19, 20. Counterpart halves of the micropylar end of a seed showing the condyle between the two limbs of the curved cavity. Fig. 20 shows a large plug of matrix filling the gaping micropyle (*m*). ×15. V.29706.

Epacridaceae. Genus? p. 108

21. A fruit lying in the matrix, sectioned longitudinally so that two locules are seen. ×15. V.29709.

? **Symplocos** sp. p. 109

22. An endocarp fractured longitudinally. A locule-cast is exposed at *lc*. The apical depression filled by matrix is at *a*. ×6·5. V.29713.

23. The same, apex. *a* is the apical depression filled by matrix. l_1, l_2, l_3 and l_4 mark the position of the locules. The outer wall is removed showing the cavity of locules l_2 and l_4. ×15.

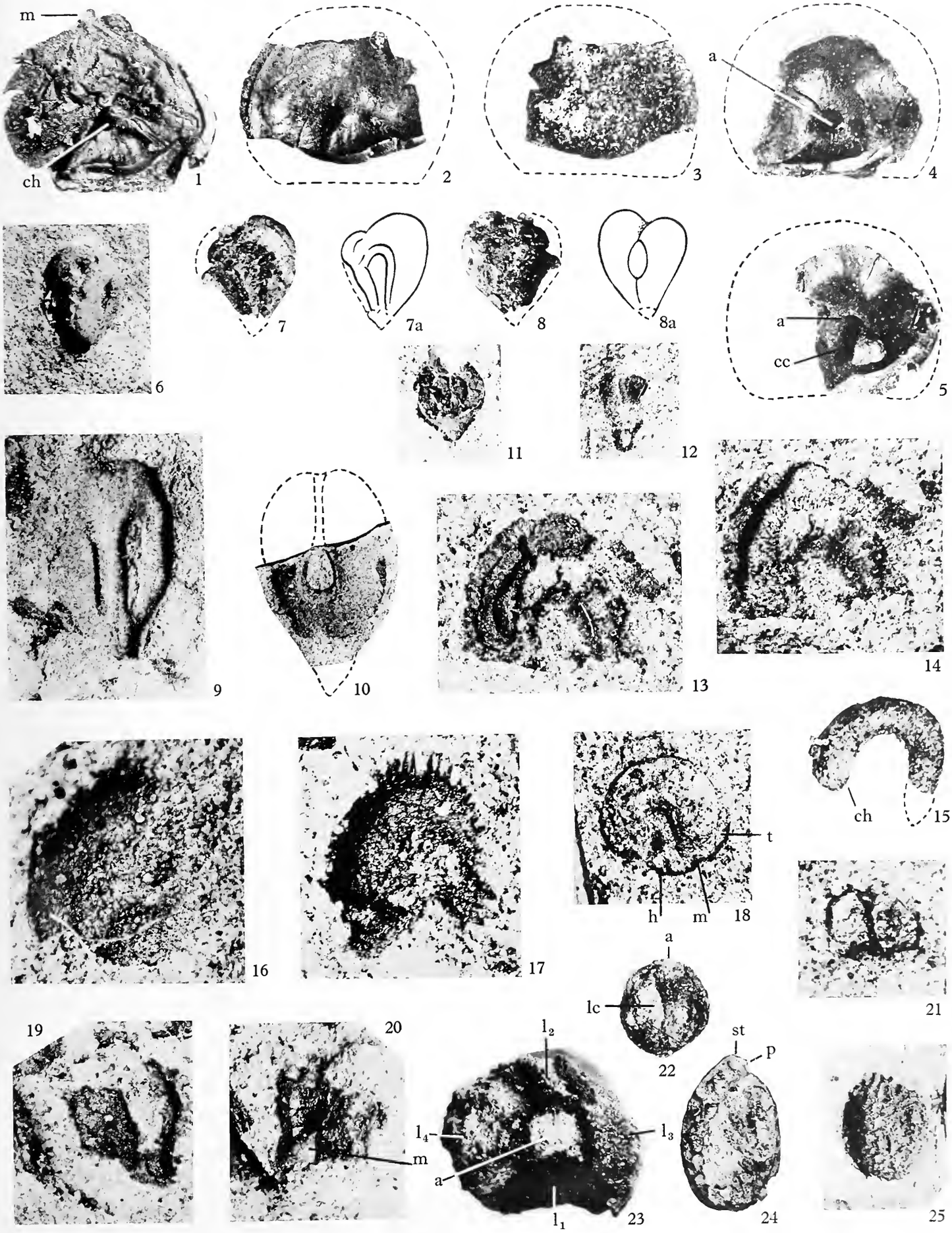
All the above from Oldhaven Beds: Bishopstone, Herne Bay, Kent.

Natsiatum eocenicum Chandler p. 110

24. A locule-cast in calcite. *p*=placenta, *st*=style. ×2·8. V.307.

25. The external impression of the same endocarp, incomplete at the apex. ×2·8.

Blackheath Beds: Chislehurst, Kent.



RHAMNACEAE GENUS (?), VITIS, MYRTOSPERMUM, EPACRIDACEAE GENUS (?), SYMPLOCOS, NATSIATUM

Explanation of Plate 12

Fig.

Laurocarpum minimum Reid & Chandler p. 111

1. Ovoid berry, side. The slight basal truncation marks the scar of attachment. ×2·75. V.29714.

   London Clay, Basement Beds: Harefield, Middlesex.

Iodes multireticulata Reid & Chandler p. 111

2. Internal cast of endocarp. (*h*) internal cast of one of the pair of horn-like processes which flank the style and placenta. ×6·5. V.29715.
3. External impression of the same endocarp, slightly imperfect around the margin at the base. (*p*) position of placenta. ×6·5.

   London Clay, Basement Beds: Harefield, Middlesex.

Meliosma cantiensis Reid & Chandler p. 112

4. Internal cast of endocarp, side, ventral surface turned to the left. ×2·75. V.29716.
5. The same, ventral surface, showing the hollow for the plug. The median vertical ridge is a cast representing the plane of suture between the two symmetrical valves along which splitting had begun. ×2·75.

   London Clay, Basement Beds: Harefield, Middlesex.

Meliosma jenkinsi Reid & Chandler p. 112

6. The internal cast of half an endocarp which has split vertically along the plane of symmetry. The ventral side is towards the left. ×2·75. V.29717.
7. The same, ventral view. (*p*) matrix in plane of symmetry; (*v*) half of the ventral hollow formerly occupied by the plug; (*m*) adherent block of matrix. ×2·75.

   London Clay, Basement Beds: Harefield, Middlesex.

Jenkinsella apocynoides Reid & Chandler p. 113

8. A locule-cast incomplete at both ends. It shows the ventral suture (marked on the cast by a vertical ridge of pyrites). ×2·75. V.29718.

   London Clay, Basement Beds: Harefield, Middlesex.
9. A perfect locule-cast showing the ventral suture. ×2·75. V.29720.

   London Clay, Basement Beds: North Harrow, Middlesex.

Carpolithus sp. p. 114

10. Half of a valve of a two-valved bisymmetric fruit lying in matrix. It shows the narrow marginal flange on the straight (ventral?) side. ×2·75. V.29721.

    London Clay, Basement Beds: North Harrow, Middlesex.

? **Selaginella** sp. p. 115

11. A spore, side view, showing reticulate ornamentation. ×18. V.29723.
12. The same, ventral view, showing the triradiate ridge and the reticulate pattern between the rays. ×18.

    London Clay, Craigweil Bed: Bognor, Sussex.

Filicales (Rachis, Type 1) p. 116

13. Transverse section of a rachis showing two distinctive S-shaped steles and strengthening tissue connecting them near the upper surface of the rachis. ×6. V.29724.

Fig.

14. Part of the same showing details of structure. (*g*) indicates the point where a gap occurs in the line of coarse vessels seen in section at (*v*, *v*). Shining patches of moisture conceal some details of structure especially in the strengthening tissue above. ×18.

    East Cliff shore, Herne Bay, Kent.

Filicales (Rachis, Type 2) p. 117

15. Transverse section of a rachis with four steles. ×6. V.29727.

    Hampton shore, Herne Bay, Kent.

Araucarites sp. p. 117

16. A twig with falcate leaves. ×2·7. V.29730.

    'Upper Fish Tooth Bed': Bognor, Sussex.

? **Araucarites** sp. p. 118

17. A small cone, side (broken transversely and part at the junction of the two fragments crumbled away). It shows the closed polygonal scales. ×9. V.29743.
18. Fragment of vascular tissue from the same cone axis showing bordered pits in a tracheid arranged in numerous rows. ×158 approx.
19. Another fragment showing bordered pits. ×158.

    'Beetle Bed': Bognor, Sussex.

? **Pinus macrocephalus** (Lindley & Hutton) p. 119

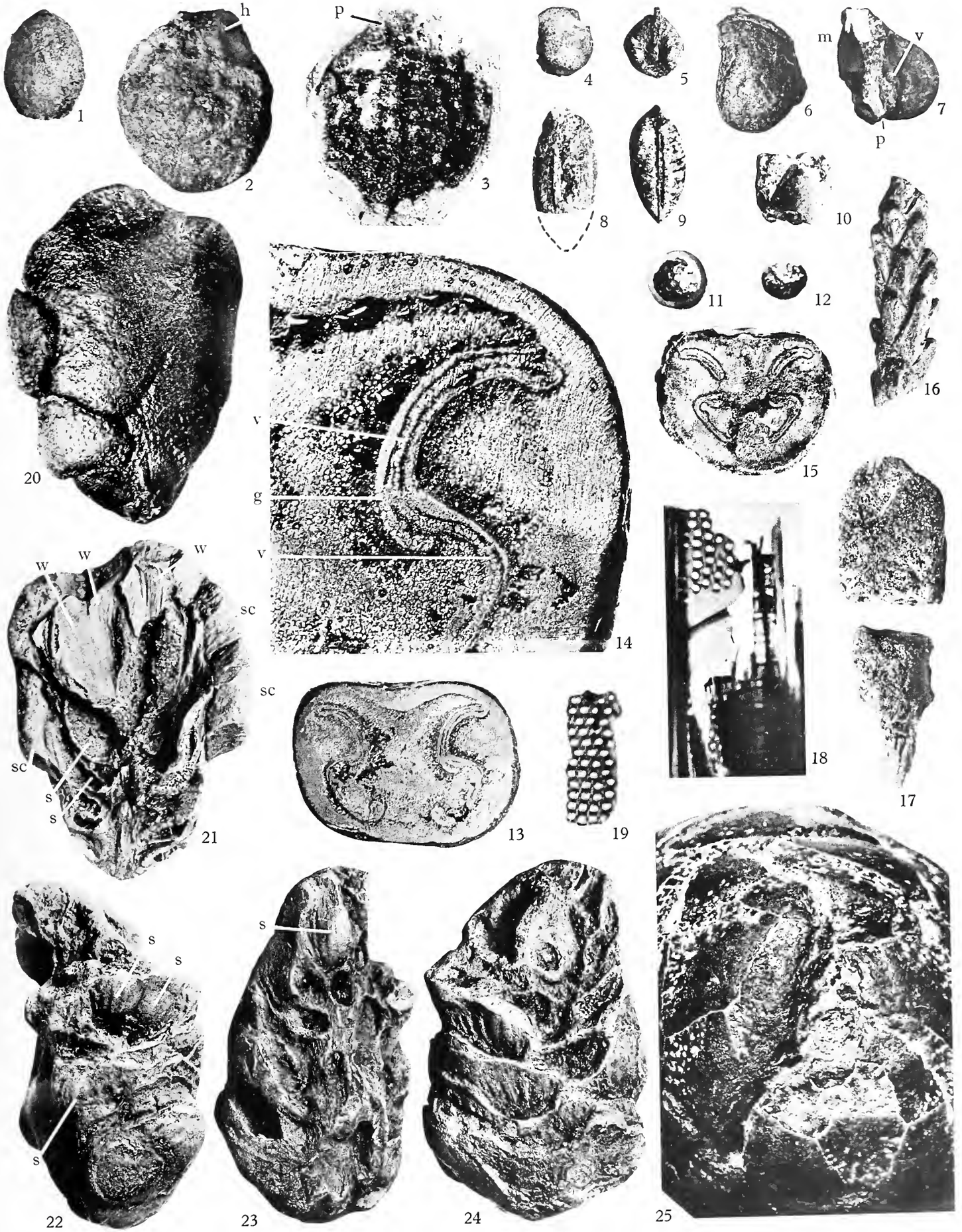
20. Exterior of an imperfect cone showing somewhat abraded carbonaceous apophyses of the scales. ×2·5. V.29744.
21. An oblique longitudinal section of the same exposed by natural abrasion. Part of the axis is visible below and the partially decayed scales with infiltrated pyrites between them are seen to arise at obtuse angles from the axis and to bend sharply upwards beyond the seeds. Casts of the seeds are seen in the pyrites (*s*,*s*). (*sc*) are the scales showing impressions of imperfect wings at (*w*, *w*). ×2·5.
22. Another much abraded cone fragment (lower part), exterior, showing casts of the hollows occupied by paired seeds (*s*) on the pyrites infillings between the now decayed scales. ×2·5.
23. The same, opposite side, showing the longitudinal section of the cone exposed by abrasion, the oval scars on the axis mark the point of origin of scales. The pyrites cast of a hollow in which a seed lay is seen at (*s*). ×2·5.
24. The same, exterior, another aspect. Abraded and decayed scales are seen and between them pyrites infillings with confluent edges. ×2·5.

    Figs. 20 and 21 Warden Point, Sheppey.
    Figs. 22–24 Herne Bay, Kent.

Pinus macrocephalus (Lindley & Hutton) p.52

25. The almost perfect apex of a silicified cone. The small rounded abortive terminal scale is seen surrounded by two pairs of angular opposite scales. The scales are somewhat worn so that resin ducts are exposed at their surfaces. The arrangement of scales is somewhat marred by an inverted Y-shaped crack. ×2. V.32224. For comparison with London Clay specimens. See also Pls. 1–3.

    Thanet Sands: Herne Bay, Kent.



LAUROCARPUM, IODES, MELIOSMA, JENKINSELLA, CARPOLITHUS, SELAGINELLA, FILICALES, ARAUCARITES, PINUS

Explanation of Plate 13

Fig.

Cupressinites oviformis n.sp. p. 121

1. Holotype. A four-valved fruit, base. Small bracts around the peduncle (clear in the specimen) are obscurely seen in the figure (at *b*, *b*). ×2·75. V.29745.

2. The same, tilted to show the apices of four gaping scales. ×2·75.

3. The same, side. ×2·75.

Warden Point, Sheppey.

? Posidonia parisiensis (Brongniart) p. 122

4. An abraded rhizome showing root scars on the lower surface and close sub-parallel ridges and furrows which may represent leaf-scars. ×1·5. V.29746.

Herne Bay, Kent.

Sabal sp. (**S. grandisperma?**) p. 123

5. Fragment from the centre of a leaf showing pinnae arising from one side of the rachis, lower surface. ×1·8. V.29751.

'Upper Fish Tooth Bed': Bognor, Sussex.

6. The central part of a leaf, lower surface showing pinnae arising from both sides of the rachis. ×2·2. V.29752.

7. The same, upper surface, with remains of ligule (*l*). Rachis also seen extending to broken edge. ×2·2.

Warden Point, Sheppey.

? Palmospermum jenkinsi Reid & Chandler p. 124

8. A seed-cast, ventral, showing the concavity of the inner chalaza exposed by removal of the hilar-chalazal thickening during abrasion. ×3. V.29756.

9. The same base, showing embryo scar (*e*). The concavity above is the ventral hollow of the inner chalaza. ×3.

East Cliff shore, Herne Bay, Kent.

Palmospermum minutum n.sp. p. 124

10. Holotype. A seed, ventral, showing the hilum, and embryo-scar (*e*). ×6·5. V.29757.

11. Another seed complete but cracked and fissured, side. ×6·5. V.29758.

12. A seed-cast, ventral, showing the hilar-chalazal scar with a narrow channel diverging from it for a short distance towards the base of the figure. ×6·5. V.29759.

'Upper Fish Tooth Bed': Bognor, Sussex.

13. A seed, ventral, showing hilar scar. ×6·5. V.29760.

14. The same, lateral view. The dorsal surface is broken away. (*h*) hilum. ×6·5.

Herne Bay, Kent.

Fig.

Palmospermum bracknellense n.sp. p. 125

15. Holotype. Seed, ventral, showing hilar-chalazal thickening lying in ventral hollow. ×3. V.29761.

16. The same, base, showing embryo-scar (centre of picture). The depression on the ventral surface is towards the base of the figure. ×3.

Modiola Beds: Bracknell, Berkshire

Palmospermum davisi n.sp. p. 126

17. Holotype. Seed-cast, ventral, with remains of hilar-chalazal plug. The position of the embryo scar on the margin is indicated by (*e*). ×2·5. V.29762.

18. The same, base, showing the embryo scar. The truncation of the outline at the base of the figure is due to the chalazal hollow. ×2·5.

Warden Point, Sheppey.

19. Another seed-cast, ventral. ×2·5. V.29763.

20. Another much abraded seed-cast, ventral. ×2·5. V.29764.

Minster, Sheppey.

21. Another seed-cast, ventral, showing inner chalazal scar. ×6·5. V.29765.

22. The same, dorsal side, showing the network of fibres which underlies the abraded integuments. ×6·5.

23. Another seed-cast, ventral. ×6·5. V.29766.

'Upper Fish Tooth Bed': Bognor, Sussex.

24. A much crushed and flattened seed with worn hilar-chalazal plug. Ventral. ×2·5. V.29767.

Minster, Sheppey.

Palmospermum pulchrum n.sp. p. 127

25. Holotype. A seed-cast with carbonaceous testa (originally present) now flaked away. Ventral, showing the deep chalazal scar narrowing to the hilum. ×2·7. V.29768.

26. The same, dorsal surface, showing the embryo-scar (*e*) near the base. ×2·7.

Warden Point, Sheppey. *In situ.*

27–31. Five much abraded and distorted or crushed oval seeds, ventral side, showing remains of the worn hilar-chalazal plug. ×2·7. V.29769–73.

Minster, Sheppey.

Palmospermum elegans n.sp. p. 128

32. Holotype. A seed-cast, ventral, showing hollow and scar of the hilar-chalazal thickening. ×2·5. V.29774.

33. The same, dorsal, showing the embryo scar (*e*). ×2·5.

Warden Point, Sheppey.

Explanation to Plate 13 *continued overleaf*

Fig.

Palmospermum subglobulare n.sp. **p.** 128

34. Holotype. A seed-cast, ventral, with part of the hilar-chalazal thickening preserved in the ventral hollow. The position of the embryo-scar is indicated at (*e*). ×2·7. V.29775.

35. The same after longitudinal fracture, looking onto the fractured surface. The position of the embryo is again indicated by (*e*). The depth of the ventral hollow is shown with its opening on the right. ×2·7.

Minster, Sheppey.

Palmospermum cooperi n.sp. p. 129

36. Holotype. A seed, ventral, showing the foramen which may mark the point of attachment of the fruit, remains of which are seen on a film of pyrites surrounding this scar. The prolongation of the chalaza depression towards the hilum is seen at (*p*). × 2·7. V.29776.

37. The same, dorsal surface (somewhat crumpled). The embryo scar is at (*e*). ×2·7.

Herne Bay, Kent.

Palmospermum ovale n.sp. p. 130

38. Holotype. A distorted sub-ovoid seed-cast, ventral, showing hilar-chalazal depression. ×2·7. V.29777.

39. The same, opposite side. ×2·7.

Warden Point, Sheppey.

Palmospermum ornatum ns.p. p. 130

40. Holotype. A seed-cast, ventral. ×2·75. V.29778.

41. The same in transverse section showing the deeply sunk hilar-chalazal scar on the right. ×6·5.

Herne Bay, Kent.

Palmospermum sp. p. 131

42. A fruit with seed-cast partially exposed. Ventral surface showing the chalazal hollow (*ch*) from which fibres can be seen to diverge. At the opposite diameter of the seed an embryo scar (not visible in the figure) is preserved. Its position is indicated by (*e*). ×6·5.

Fig.

43. The same, dorsal. The seed is partially collapsed on the right and is exposed by the flaking off of the fruit and locule-cast. ×6·5.

Herne Bay, Kent.

Palmospermum sp. **p.** 131

44. A seed partially obscured by remains of fruit. Ventral side, showing hilar-chalazal hollow. ×2·8. V.29779.

45. The same, dorsal, showing furrows (perhaps impressions of fibres lining the locule-wall). ×2·8.

'Upper Fish Tooth Bed': Bognor, Sussex.

Palmospermum sp. p. 132

46. An endocarp or fruit, ventral, showing the oval scar leading into a deep club-shaped hollow. ×2·75. V.29780.

47. The same, side. ×2·75.

48. The same, fractured surface, after longitudinal fracture, showing the deep curved ventral depression in section. ×2·75.

Herne Bay, Kent.

Palmospermum? sp. 7 **p.** 132

49. Seed, ventral, showing opening of chalazal depression. ×2·75. V.29781.

50. The same seed, side. ×2·75.

51. The same, fractured surface after longitudinal fracture. ×2·75.

Warden Point, Sheppey.

CUPRESSINITES, POSIDONIA, SABAL, PALMOSPERMUM

Explanation of Plate 14

Fig.

? **Palmospermum** sp. p. 132

1. Fruit slightly imperfect above on the left. ×6·5. V.29785.

2. The same, opposite side where the endocarp is exposed through fracture and removal of part of the exocarp. ×6·5.

3. The same turned through 90° so as to show the short transverse basal broadening at the attachment (*a*). Above part of the endocarp (*e*) is broken away exposing the seed (*s*). ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Nipa burtini (Brongniart) p. 133

4. The apex of a compressed fruit. ×1·5. V.29786.

5. A small abortive but well-preserved fruit. ×1. V.29788.

6. A much compressed abortive fruit imperfect at the base. ×1.

7. A small three-angled immature fruit. ×1. V.29787.

8. A fruit with pericarp (*p*) preserved at the base and near the apex where a small patch still clings to the seed on the right hand side. Elsewhere it has broken away exposing the seed-cast with its characteristic fine corrugations. ×1. V.24143.

9. A poorly preserved fruit. Longitudinal fibres of the sarcocarp are at (*f*), the seed at (*s*). ×1·3. V.36340.

Figs. 4, 7 'Upper Fish Tooth Bed': Bognor, Sussex. Figs. 5, 6 Swale Cliff, Herne Bay. Fig. 8 Bracknell, Berkshire. Fig. 9 Verwood, Dorset.

Nipaceae or Palmae. Genus? p. 134

10. Male flower ×2·75. V.29797.

'Upper Fish Tooth Bed': Bognor, Sussex.

Petrophiloides richardsoni Bowerbank p. 136

11. A strobil embedded in pyrites so that only the outer surfaces of the scales are visible as at (*s*,*s*). ×2·3. V.29798.

12. A strobil from which most of the fruitlets have fallen leaving the gaping scales. ×2. V.29799.

13. A much abraded strobil with fruitlets exposed, some (*f*, *f*) more or less perfect, others worn down in different degrees so that transverse sections at different levels are shown. ×2·5. V.29800.

Fig.

14. A denuded strobil showing lozenge-shaped scars (remains of abraded scales). All somewhat encrusted with a film of pyrites. ×2·3. V.29801.

Figs. 11, 14 'Upper Fish Tooth Bed': Bognor, Sussex. Fig. 13 'Beetle Bed': Bognor, Sussex. Fig. 12 Holland-on-Sea, Clacton (Fiddle Dock), Essex.

Juglandicarya depressa Reid & Chandler p. 137

15. An abraded endocarp, apex, showing the locule-cast. Plane of splitting indicated by dotted lines. ×2·5. V.29806.

'Upper Fish Tooth Bed': Bognor, Sussex.

? **Juglandicarya lubbocki** Reid & Chandler p. 137

16. Side of endocarp looking onto suture. The specimen is abraded so as to expose the edge of the locule-cast (=seed). ×2·7. V.29304.

17. The same, base, abraded so as to expose the locule-cast, four-lobed at the extreme base, two-lobed a little higher up. ×2·7.

Herne Bay, Kent.

Juglandicarya sp. (**J. lubbocki**?) p. 138

18. An endocarp apex (abraded at the apex so as to show the unusual trisymmetry of the seed. ×2·7. V.29805.

Herne Bay, Kent.

Juglandicarya minuta n.sp. p. 138

19. Holotype. An abraded endocarp, apex. ×6·5. V.29809.

20. The same, base. The locule-cast is exposed on the right where part of the valves of the endocarp are broken away. ×6·5.

21. The same side, looking approximately along the plane of dehiscence and onto the plane of symmetry at right angles to it. (*t*) broken apex of locule-cast. ×6·5.

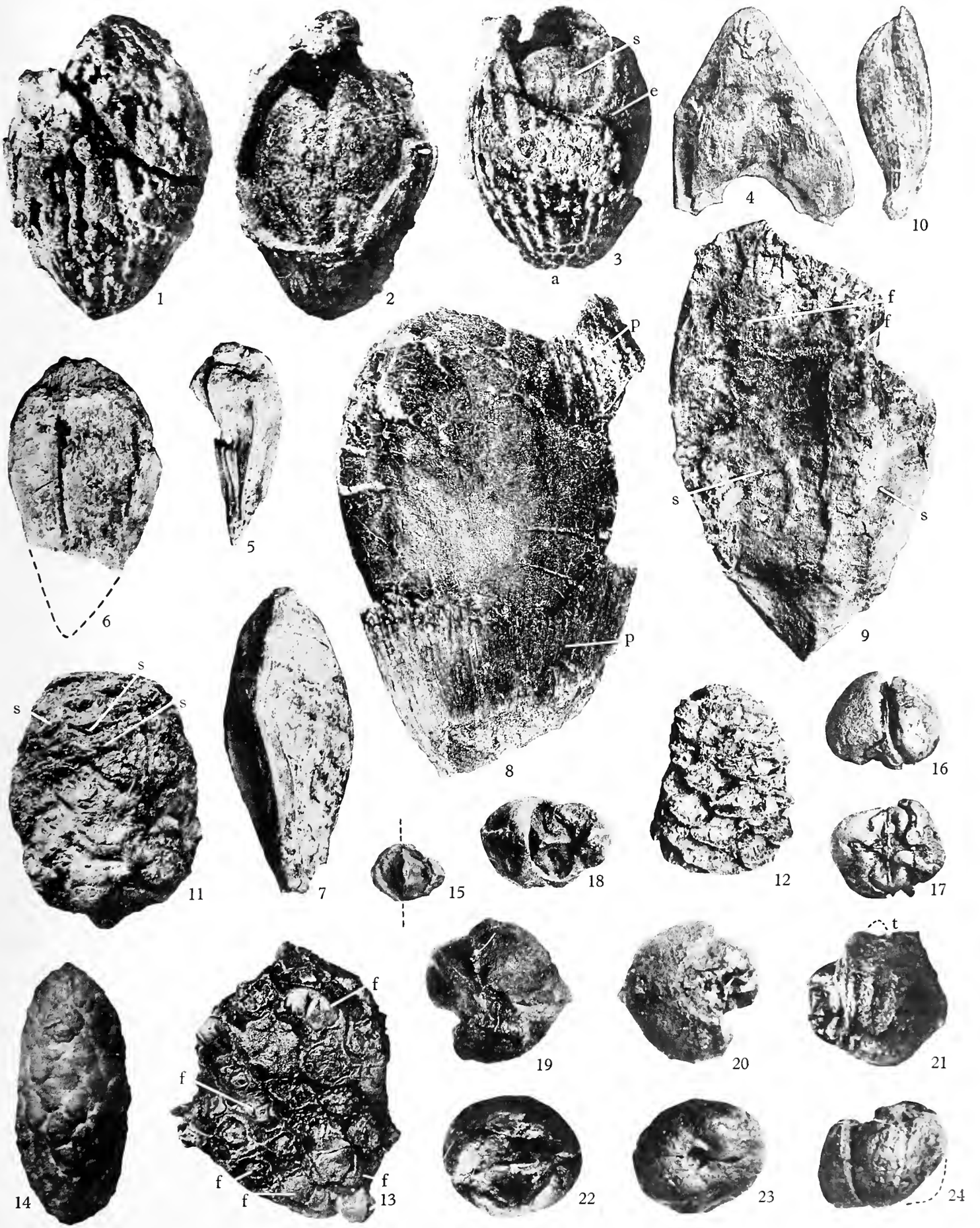
East Cliff shore, Herne Bay, Kent.

22. Apex of another endocarp somewhat abraded so as to expose the locule-cast above. ×6·5. V.29810.

23. The same, base. ×6·5.

24. The same, side (distorted, and abraded above). ×6.5.

Warden Point, Sheppey.



PALMOSPERMUM, NIPA, PETROPHILOIDES, JUGLANDICARYA

Explanation of Plate 15

Fig.

Juglandicarya bognorensis n.sp. p. 140

1. Holotype. Locule-cast (=seed) looking onto the edge of the plane of dehiscence. Adherent remains of the abraded endocarp are seen to the left and right. ×6·5. V.29811.

2. The same, looking towards the surface of the plane of dehiscence. Locule-cast much obscured by remains of adherent abraded endocarp. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Juglandicarya cooperi n.sp. p. 141

3. Holotype. Locule-cast (=seed) looking onto the edge of the plane of dehiscence with remains of adherent endocarp on the two sides. ×2·75. V.29814.

4. The same, looking towards the surface of the plane of dehiscence. ×2·75.

5. The same, base. (*d*) plane of dehiscence, (*s*) plane of septum at right angles to it. ×2·75.

Herne Bay, Kent.

? Morus sp. p. 144

6. Endocarp, apical end showing the triangular aperture (*a*) for the passage of fibres to the placenta. ×6.5. V.29815.

7. The same, side view showing one longitudinal angle. ×6·5.

Warden Point, Sheppey. *In situ.*

Moraceae. Genus? p. 145

8. Locule-cast, apex, showing placental scar. ×2·7. V.29816.

9. The same, side view. ×2·7.

Herne Bay, Kent.

10. Part of a fruiting spike showing spirally arranged bracts of pulpy fruits with lobed distal extremities. ×8. V.29817.

11. The same, transversely fractured, showing a bract transversely sectioned (*b*), a perfect fruitlet with two styles (f_1) exterior, a fruitlet fractured longitudinally showing the thickness of the walls (f_2) and several other fruitlets longitudinally tangentially sectioned. (*l*) lateral fruitlets, (*m*) median fruitlets. ×9.

12. The counterpart of Fig. 11, lettering as in Fig. 11. ×9.

13. A tangential longitudinal section of the spike obtained by rubbing down its surface. The individual bracts, lozenge-shaped in transverse section as here seen, show their pulpy structure. On the upper surface of each three fruitlets are borne. One fruit at the middle of each bract is oriented with its longer transverse axis vertical (more or less). One on each side is obliquely oriented. Each fruitlet shows the lens-shaped transverse section, a thin epicarp, and thicker endocarp. There is evidence of an axis through the middle of each bract. The section shows that the superficial lobing of the bracts does not persist throughout their length. If as is probable they were formed by the fusion of several smaller bracts, the fusion is complete below. ×15.

Heren Bay, Kent.

Fig.

Erythropalum turbinatum n.sp. p. 148

14. Holotype. Apex of the locule-cast. ×2·7. V.29819.

15. Side of the same. ×2·7.

Warden, Sheppey.

Erythropalum jenkinsi n.sp. p. 148

16. Holotype. Locule-cast base showing the fibres. On the right the locule-cast is chipped away exposing the seed. ×2·5. V.29820.

17. The same, side, The seed is exposed in the lower part on the right hand side. The specimen is imperfect in the upper half on the right. ×2·5.

East Cliff shore, Herne Bay, Kent.

Tinomiscium taylori n.sp. p. 149

18. Holotype. Ventral surface of an endocarp showing the median ridge with sub-apical scar (*p*) marking the entrance of the fibro-vascular strands to the placenta, ridges and tubercles radially aligned near the base, and scarcely perceptible hollowing of the ventral surface. ×6·5. V.30574.

19. Another specimen, dorsal, showing median ridge and transverse nodular ridges on each side of it. ×2·7. V.29823.

20. The same, side view. ×2·7.

21. The same, in transverse section exposed by fracture of the specimen. The seed (*s*) is seen in section surrounded by the thick fibrous carpel walls. Pyrites (granular in appearance) adheres to the ventral surface at (*p*, *p*). ×6·5.

Fig. 18 'Beetle Bed': Bognor, Sussex. Figs. 19–21 Herne Bay, Kent.

Menispermicarpum venablesi n.sp. p. 151

22. Holotype. Endocarp, dorsal. The carpel wall is missing at the upper end exposing the locule-cast (*l*) with its rounded shallow pits. ×6·5. V.30575.

23. The same, ventral. The carpel wall is complete on this side of the specimen. (*p*) indicates the scar where the fibro-vascular cord passes to the placenta. The long narrow apertures leading into the hollow lateral ridges can be seen near the two lateral margins. The median ridge flanked by shallow concave areas is visible. ×6·5.

24. The same, side, showing the tubercles on the dorsal surface (left) and the smooth surface of one of the lateral ridges. The small recurved beak at the stylar end is clear. ×6·5.

25. Another specimen, dorsal surface. The carpel wall is abraded showing the locule-cast with shallow pits. ×6·5. V.30576.

26. The same, ventral side which retains a film of the carpel wall. The lateral ridges with the slit-like openings are seen at the sides. The marked median ridge suggests that dehiscence had started and a plate of hard pyrites had formed in the crack. ×6·5.

Explanation to Plate 15 continued overleaf

Fig.

27. The same, side view with ventral surface to left, tilted so as to show the apex at (*a*), one lateral ridge (cast of hollow with film of actual endocarp wall) (l_1) and, out of focus behind, the other lateral ridge at (l_2). ×6·5.

28. Another specimen with locule-cast exposed over most of the surface, by chipping away the dorsal wall of the endocarp which was encrusted with pyrites. Remains of pyrites and carpel are seen around the base and sides. ×6·5. V.29824.

Fig. 28 'Upper Fish Tooth Bed', all others from 'Beetle Bed': Bognor, Sussex.

Tinospora excavata Reid & Chandler p. 152

29. Neotype. A perfect unabraded endocarp showing tubercles. Ventral side showing hollow. ×6·5. V.29825.

30. A second endocarp showing tubercles in a more abraded condition, also ventral. The carbonaceous wall can be seen cracking and ready to flake away. ×6·5. V.29826.

Fig.

31. A locule-cast, ventral. ×6·5. V.29827.

32. A somewhat abraded endocarp showing remains of much-worn tubercles. The ventral surface is turned partially towards the right. In places the carpel wall is chipped away exposing the smooth locule-cast. ×6·5. V.29828.

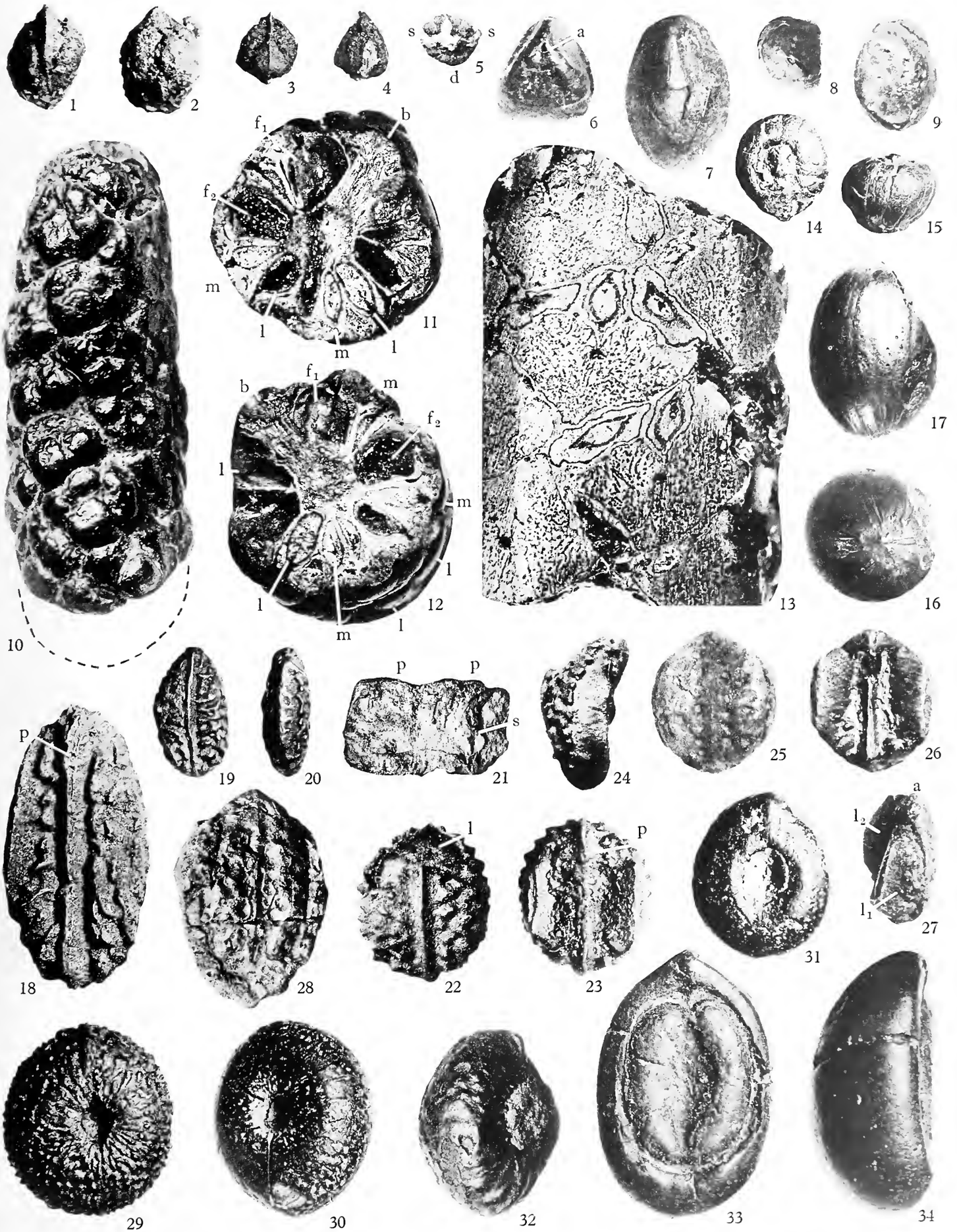
Figs. 29, 30 Warden Point, Sheppey, Fig. 30 *In situ*. Figs. 31, 32 'Upper Fish Tooth Bed': Bognor, Sussex.

Calycocarpum ? jenkinsi n.sp. p. 154

33. Holotype. An endocarp represented by a locule-cast, ventral, showing the pair of plates (divided medianly) closing the ventral aperture, or a median partition with pyrites filling the cavities on each side of it. ×6·5. V.29835.

34. The same, lateral view, the ventral hollow is turned towards the right. ×6·5.

Herne Bay, Kent.



JUGLANDICARYA, MORUS, MORACEAE GENUS (?), ERYTHROPALUM, TINOMISCIUM, MENISPERMICARPUM, TINOSPORA, CALYCOCARPUM

Explanation of Plate 16

Fig.

Frintonia ornata n.gen. & sp. p. 155

1. Holotype. Endocarp, dorsal surface, showing median ridge and dorsal rows of hair-bases (*f*) now embedded in pyrites. ×6·5. (cf. Text-fig. 19A). V.29836.

2. The same, ventral surface (longitudinally fractured) showing masses of pyrites (*p*) filling the two ventral hollows. ×6·5. (cf. Text-fig. 19B).

3. The same, longitudinally fractured (ventral side to right) showing placenta (*pl*), locule-cast, and hair bases (*f*), ×6·5. (cf. Text-fig. 19E).

4. The same, longitudinally fractured, ventral view of locule-cast with remains of endocarp still adhering on the right. Placenta (*pl*). The endocarp has been removed on the left. Hair bases are seen in section at (*f*, *f*). ×6·5.

   Frinton Cliffs, between Frinton and Walton-on-Naze, Essex.

Davisicarpum gibbosum n.gen. & sp. p. 157

5. Holotype. Endocarp, side with furrows, showing gibbous ventral margin. ×6·5. V.29837.

6. The same, opposite side. The depression at (*f*) may mark the foramen. ×6·5.

7. The same, margin, looking onto stylar limb. ×6·5.

   Wærden Point, Sheppey.

Wardenia davisi n.gen. & sp. p. 158

8. Holotype. Endocarp, side. (*f*) foramen, (*s*) stylar limb. ×6·5. V.29838.

   Warden Point, Sheppey.

Palaeosinomenium venablesi n.gen. & sp. p. 159

9. Holotype. Carbonaceous endocarp showing the form and the horseshoe shaped ridge. The long foramen is seen at (*f*). (*s*) stylar limb. ×6·5. V.29839.

10. The same, opposite side, showing very clearly the blunt ended ridges on the marginal flange. (*f*) the foramen. ×6·5.

11. The same, after the carbonaceous endocarp had flaked away exposing the locule-cast and in places the seed. (*r*) the radicular limb with micropyle at its tip. (*ch*) hilum and chalaza. ×15.

Fig.

12. A much abraded locule-cast with adherent film of endocarp over the central area. The foramen is clearly seen but is enlarged by collapse of the pyrites cast near the condyle. ×6·5. V.29840.

13. The opposite side of the same cast, (*s*) the stylar limb. ×6·5.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Diploclisia bognorensis n.gen. & sp. p. 161

14. Holotype. An endocarp showing the perfect form, and the ornamentation partly concealed by a film of granular pyrites. (*s*) stylar limb, (*sl*) slit between the limbs at the base. The median foramen is clearly seen at (*f*). ×6·5. V.30580.

15. The same, opposite side. Lettering as in Fig. 14. The median foramen is partially obscured by pyrites. The groove along the crest of the horse-shoe shaped ridge is apparent, the nodules on each side of it are seen near the base on the left hand limb. ×6·5.

16. Another endocarp broken at the base. It shows pits produced on the marginal flange between the radial ridges. ×6·5. V.29841.

17. A seed-cast imperfect at the cotyledonary end. It is partially covered by remains of locule-cast and in places there is a film of adherent endocarp. (*r*) radicular limb. ×6·5. V.29842.

    Figs. 14, 15 'Beetle Bed': Bognor, Sussex. Figs. 16, 17 'Upper Fish Tooth Bed': Bognor, Sussex.

Magnolia lobata (Bowerbank) p. 163

18. A seed. (*ch*) position of chalaza. ×6·5. V.29843.

Magnolia subquadrangularis (Bowerbank) p. 163

19. A seed-cast. (*ch*) position of chalaza. ×6·5. V.29848.

Magnolia crassa Reid & Chandler p. 163

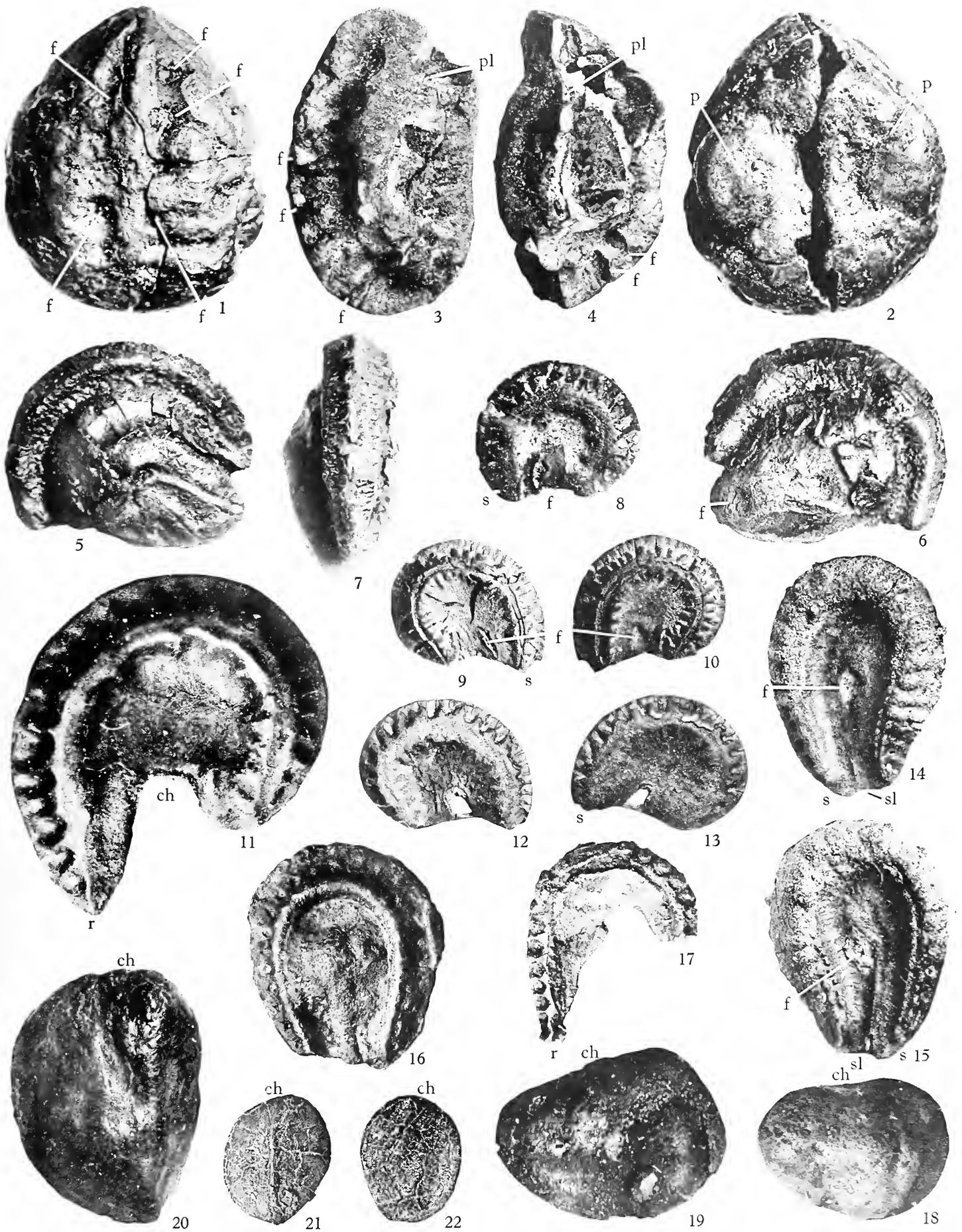
20. A seed showing the facetting of one surface. (*ch*) chalaza. ×6·5. V.29852.

    The above from 'Upper Fish Tooth Bed': Bognor, Sussex.

21. A seed (much crushed) showing the facetted surface. (*ch*) chalaza. ×2·7. V.29853.

22. The same, opposite side. (*ch*) chalaza. ×2·7.

    Warden Point, Sheppey.



FRINTONIA, DAVISICARPUM, WARDENIA, PALAEOSINOMENIUM, DIPLOCLISIA, MAGNOLIA

Explanation of Plate 17

Fig.

Pterocaryopsis bognorensis n.gen. & sp. p. 142

1. Holotype. Winged fruit, dorsal side abraded so that the locule-cast (simulating the lobed seed) is exposed flanked on the two sides by the thick parenchymatous wings. ×14. V.30585.

2. The same, ventral, (*a*) marks the hollow for attachment. (*st*) the style. The wing on the right is cut off by the margin of the plate. The locule-cast is not so fully exposed as on the dorsal side but it shows that the lobes of the seed on this ventral surface were more sharply angled medianly, and more parallel-sided. ×14.

'Beetle Bed': Bognor, Sussex.

Magnolia angusta Reid & Chandler p. 164

3. A seed with internal cast exposed along the right hand margin by the breaking of the testa. ×6·5. V.29861.

4. A seed-cast slightly imperfect near the chalaza. ×6·5. V.29862.

'Upper Fish Tooth Bed': Bognor, Sussex.

Magnolia subcircularis Reid & Chandler p. 164

5. A facetted seed-cast with testa largely abraded. ×6·5. V.29869.

6. A seed with remains of testa. ×6·5. V.29870.

7. A seed with remains of testa. ×6·5. V.29870*a*.

8. A seed with remains of testa. ×6·5. V.29870*b*.

9. A compressed seed-cast with abraded remains of testa. ×6·5. V.29871.

'Upper Fish Tooth Bed': Bognor, Sussex.

?**Magnolia enormis** (Bowerbank) p. 166

10. A seed with testa preserved. The hollow and aperture for the chalazal fibres is clearly seen at the top of the picture. ×2·8. V.29887.

Magnolia gigantea n.sp. p. 166

11. Holotype. A seed with testa preserved but somewhat abraded. (*ch*) position of chalaza (obscured by testa). ×2·75. V.29890.

Magnolia davisi n.sp. p. 166

12. Holotype. A seed. ×2·8. V.29891.

13. Another seed. ×2·8. V.29892.

The above from Warden Point, Sheppey.

Magnolia lata n.sp. p. 167

14. Holotype. A seed. ×6·5. V.29893.

'Upper Fish Tooth Bed': Bognor, Sussex.

Magnolia oblonga n.sp. p. 167

15. Holotype. A seed-cast showing clearly the large narrow oval chalazal scar (*ch*). ×6·5. V.29894.

16. Another seed-cast with chalaza at (*ch*). In this actual specimen successive coats are shown on films of pyrites. ×2·8. V.29895.

Fig.

17. A third seed-cast. ×2·8. V.29895*a*.

18. A crushed seed unusually long in relation to the breadth for this species. ×6·5. V.29896.

Fig. 15 East Cliff shore, Herne Bay, Kent. Figs 16–18 Warden Point, Sheppey. Fig. 18 *In situ*.

Magnolia pygmaea n.sp. p. 168

19. Holotype. A seed-cast with large chalazal scar (*ch*). ×6·5. V.29900.

Warden Point, Sheppey.

Magnolia symmetrica n.sp. p. 168

20. Holotype. A seed with somewhat rugose testa now flaking away. ×6·5. V.29901.

Warden Point, Sheppey. *In situ*.

21. A seed-cast with testa preserved over the chalazal end of the seed, but completely broken away over the micropylar end. The aperture for the fibres to enter to the chalaza is seen at (*ch*). ×6·5. V.29902.

22. A sub-circular seed with most of the testa flaked away showing the structure of the inner integuments. Chalaza at (*ch*). ×6·5. V.29903.

'Upper Fish Tooth Bed': Bognor, Sussex.

Magnolia rugosa n.sp. p. 169

23. Holotype. A seed with rugose testa largely preserved. ×6·5. V.29905.

24. The same seed, opposite side. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Anonaspermum commune Reid & Chandler p. 170

25. Two seeds closely appressed as in growth in the fruit. ×2. V.29908.

?**Anonaspermum pulchrum** Reid & Chandler p. 170

26. A seed in which the ruminations are obscured by adherent inner layers of testa. ×2·8. V.29910.

The above from Warden Point, Sheppey. Fig. 26 *In situ*.

Anonaspermum minimum Reid & Chandler p. 170

27. A seed-cast with a mere film of pyrites over part of the surface. ×6·5. V.29911.

Anonaspermum ovale Reid & Chandler p. 170

28. A seed-cast with ruminations partially obscured by remains of testa. ×2·8. V.29913.

The above from 'Upper Fish Tooth Bed': Bognor, Sussex.

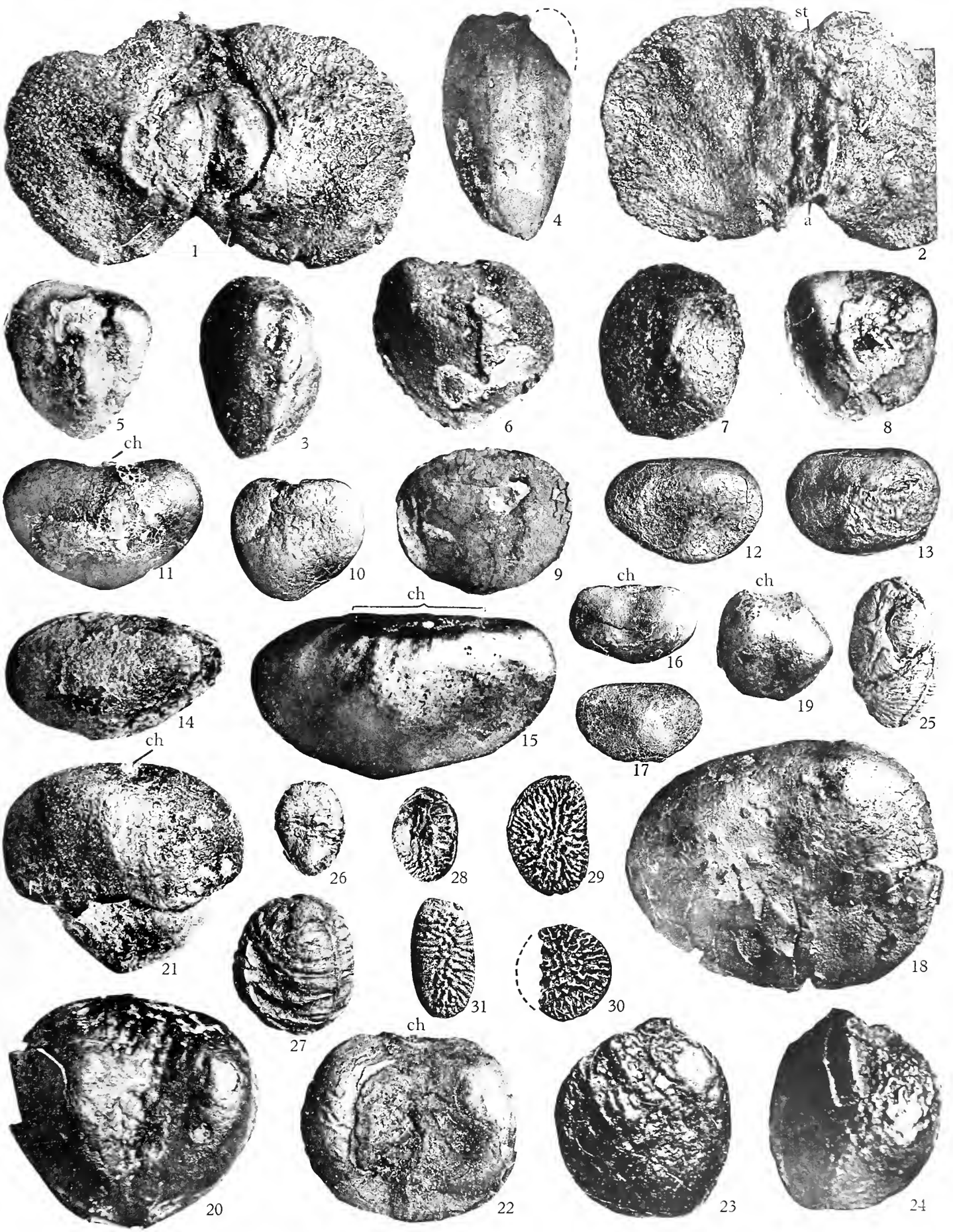
Anonaspermum complanatum Reid & Chandler p. 171

29. A seed-cast. ×2·8. V.29916. Sheppey.

30. A seed-cast. ×2·8. V.29917. Warden Point, Sheppey.

Anonaspermum anoniforme Reid & Chandler p. 171

31. A seed-cast. ×2·8. V.29918. Warden Point, Sheppey.



PTEROCARYOPSIS, MAGNOLIA, ANONASPERMUM

Explanation of Plate 18

Fig.

Anonaspermum anoniforme Reid & Chandler p. 171

1. A seed with testa preserved exeept at the distal end where the ruminations on the seed-cast are exposed. ×2·8. V.29919.

Anonaspermum complicatum n.sp. p. 171

2. Holotype. A seed-east with part of the testa still adhering. ×2·8. V.29920.

Anonaspermum spp. p. 172

3. A seed-east with mueh testa still adhering. ×2·8. V.29921.

The above from Warden Point, Sheppey.

4. A seed-cast. ×2·8. V.29922. 'Upper Fish Tooth Bed': Bognor, Sussex.

Cinnamomum globulare Reid & Chandler p. 173

5. A berry, tilted to show attaehment (*a*), lying in septarian nodule. ×2·8. V.29924. Beach below Warden Post Office, Sheppey. *In situ.*

6. A berry, side view, showing attaehment (*a*). ×2·8. V.29925.

7. Another. Attachment sear at (*a*). ×2·8. V.29926.

8. Another with exoearp worn away below. ×2·8. V.29925*a*.

Cinnamomum grande Reid & Chandler p. 173

9. A berry somewhat depressed from above below and with the basal sear partly abraded. ×2·25. V.29929.

Cinnamomum ovoideum n.sp. p. 173

10. Holotype. A berry, side, with well-preserved epicarp. (*a*) attaehment scar. ×2·7. V.29935.

11. Another, side, with exocarp partly abraded so as to expose the seed. Where preserved the epicarp shows the eircular punetations very elearly. ×2·7. V.29936.

The above from 'Upper Fish Tooth Bed': Bognor, Sussex.

12. A typieal berry, side. (*a*) attachment scar. ×2·7. V29937.

Cinnamomum oblongum n.sp. p. 174

13. Holotype. A berry with part of the leathery epicarp removed on the right. ×2·7. V.29939.

14. Another berry broken at the base to expose the ehalaza (*ch*) on the seed-east. ×2.7. V.29940.

The above from Herne Bay, Kent.

15. A seed showing the ehalaza (*ch*). Remains of the berry adhere at the apex. ×2·7. V.29941. East Cliff shore, Herne Bay, Kent.

Fig.

16. A berry with epiearp partially removed exposing the mesoearp fibres and cells. The ehalazal end of the seed (*ch*) is also exposed below. ×2·7. V.29942. Warden Point, Sheppey. *In situ.*

17. A berry with basal attaehment sear (*a*). A slight break at the apex and aeereseent pyrites gives a false appearanee of a sear there. ×2. V.29943. Frinton, Essex.

18. A berry (somewhat distorted) broken below to show the chalaza and eotyledons (*ch*). ×2·7. V.29944.

'Upper Fish Tooth Bed': Bognor, Sussex.

Litsea pyriformis Reid & Chandler p. 175

19. A eupule. The berry is broken away at the level of the rim of the eupule. ×2. V.29950.

'Upper Fish Tooth Bed': Bognor, Sussex. *In situ.*

Beilschmiedia bognorensis n.sp. p. 176

20. Holotype. A seed with adherent remains of berry (*b*) seen from above. (c_1) and (c_2) the two cotyledons. (*j*) plane of separation of two eotyledons. (*r*) radiele. ×2·8. V.29959.

21 The same, showing the junetion of the two eotyledons (*ch*) at the base and remains of berry (*b*). ×2·8.

22 The same, side view. The junction of the two eotyledons and strap-shaped ehalaza is seen at (*ch*). (*r*) radiele, (*b*) remains of berry. ×2·8.

'Upper Fish Tooth Bed': Bognor, Sussex.

Protoravensara sheppeyensis Reid & Chandler p. 177

23. A distorted fruit abraded so as to show the furrowed loeule-east. (*sc*) sunk basal sear of attachment, (*l,l,l*) lobes of the furrowed locule-east protruding through the remains of the exoearp and endoearp. Their exaet eourse is obseured by unequal abrasion eombined with the distortion whieh has oeeurred. ×2·7. V.29960.

'Upper Fish Tooth Bed': Bognor, Sussex.

Laurocalyx globularis Reid & Chandler p. 177

24. Apex of berry enelosed almost eompletely in its cupule. ×1·75. V.29963.

25. The side of the same eupule. ×1·75.

Hampton, Swale Cliff, Herne Bay, Kent.

Laurocarpum (?**Endiandra**) sp. p. 183

26. Side view of erushed and abraded endocarp. ×2·6. V.30011.

27. The same, apex, showing sear entered by fibres (raphe). ×2·6.

Warden Point, Sheppey.

Explanation to Plate 18 *continued overleaf*

Fig.

Laurocarpum paradoxum Reid & Chandler p. 178

28. A seed with adherent remains of endocarp. (*a*) large transverse aperture for funicle. ×2·7. V.29965.
'Upper Fish Tooth Bed': Bognor, Sussex.

Laurocarpum ovoideum Reid & Chandler p. 178

29. Berry, exterior, tilted to show attachment (*a*). ×2·4. V.29969.

30. The same fractured longitudinally to show the seed and closely adherent endocarp. (*m*) thick mesocarp below the seed. ×2·4.
Herne Bay, Kent.

31. Another berry, exterior side showing obscure longitudinal fluting and large basal scar (*a*). ×2. V.29970.

32. Longitudinally fractured surface of the same showing the endocarp and seed. ×2.
Frinton, Essex.

Laurocarpum minimum Reid & Chandler p. 179

33. A berry, side view, showing flattening of outline due to basal scar of attachment. ×2·8. V.29973.
Warden Point, Sheppey. *In situ.*

34. Another berry, side, showing basal scar. ×2·8. V.29974.

35. Another berry, side, with shining epicarp well-preserved in parts. ×2·8. V.29975.
'Upper Fish Tooth Bed': Bognor, Sussex.

36. A seed-cast, side, showing chalaza, probably belonging to this species. ×2·7. V.29979.
Warden Point, Sheppey.

Laurocarpum minutissimum Reid & Chandler p. 180

37. A seed, side, showing lateral raphe and basal chalaza. ×2·7. V.29980.

Fig.

38. Another seed doubtfully referred to this species. ×6·5. V.29981.
'Upper Fish Tooth Bed': Bognor, Sussex.

Laurocarpum sp. 16 p. 180

39. A crushed endocarp and seed. ×2·8. V.29985.
'Upper Fish Tooth Bed': Bognor, Sussex.

Laurocarpum sp. 18 p. 180

40. A seed partially obscured by adherent endocarp and testa. The junction of the large plano-convex cotyledons is seen at (*p*). ×2·7. V.29992.

41. The same, apex. The position of the plane between the two cotyledons is seen at (*p*). ×2·7.
Herne Bay, Kent.

Laurocarpum davisi n.sp. p. 181

42. Holotype. A berry, side, exterior. ×2·65. V.29993.

43. The same, longitudinally fractured surface, to show the endocarp (*e*) and thick mesocarp (*m*). ×2·65.
Warden Point, Sheppey.

Laurocarpum cupuliferum n.sp. p. 181

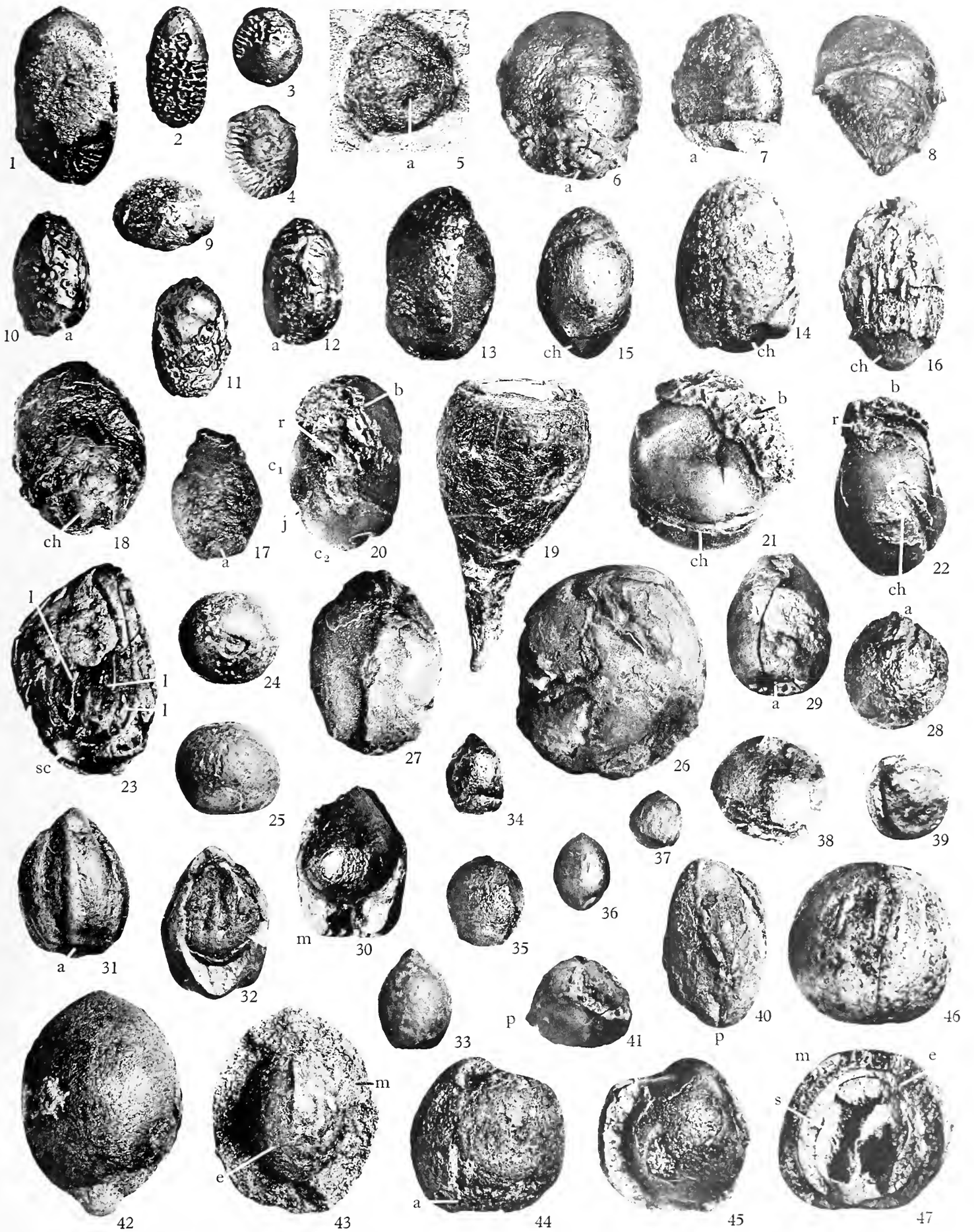
44. Holotype. A berry, side, showing the large scar of attachment (*a*) which indicates either a cupule, or a large swollen peduncle. ×2·7. V.29995.

45. The same, fractured longitudinally, showing the endocarp and seed. ×2·7.
Herne Bay, Kent.

Laurocarpum inornatum n.sp. p. 182

46. Holotype. Berry, side, exterior, somewhat abraded so as to expose longitudinal fibre strands. ×2·7. V.29996.

47. The same, fractured longitudinally, showing mesocarp (*m*), endocarp (*e*) and seed (*s*). ×2·7.
Swale Cliff, Herne Bay, Kent.



ANONASPERMUM, CINNAMOMUM, LITSEA, BEILSCHMIEDIA, PROTORAVENSARA, LAUROCALYX, LAUROCARPUM

Explanation of Plate 19

Fig.

Laurocarpum sp. p. 183

1. A berry showing sunk apical scar (*s*). The mesocarp is exposed in parts by abrasion, also the endocarp (*e*). The seed is exposed at the base and shows the chalaza (*ch*). ×6·5. V.30004. Sheppey.

Laurocarpum sp. p. 183

2. Fruit, side, showing the basal flattening suggesting attachment to a small cupule or swollen peduncle. ×2·8. V.30005.

3. The same fruit, fractured longitudinally, showing a section through mesocarp (*m*) and endocarp (*e*) and the impression of part of the lateral surface of the seed (which is fluted) and of the chalaza (smooth) at (*s*) . ×2·8.

4. The seed, side, showing flutings immediately above the chalaza (*ch*). Remains of the endocarp cemented to the seed by a thick layer of pyrites are seen on the right at (*e*) and above on the left (*e*). ×2·7.

5. The same, from below, showing the large smooth chalaza bounded by the fluted sides of the seed. Remains of endocarp on the right. ×2·8.

6. The same, from above, hilar end. Remains of endocarp on the right. ×2·8.

Herne Bay, Kent.

Laurocarpum sp. p. 184

7. Apex of the abraded fruit showing the pentagonal scar and remains of style also the ridges of infiltrated pyrites diverging from it. ×2·8. V.30006.

8. The same, side, with outer layers of mesocarp abraded. The chalaza is partly exposed below. ×2·8.

East Cliff shore, Herne Bay, Kent.

Laurocarpum sp. p. 185

9. An abraded fruit, side. The mesocarp (*m*) is preserved around the upper end and around the base. The seed-cast is exposed where the fruit is broken away at (*s*). ×2·8. V.30007. Herne Bay, Kent.

Laurocarpum sp. p. 185

10. A seed (*s*), side, with adherent remains of fruit (*f*) above. The broad stylar-placental plug is at (*st*). ×2·8. V.30008.

11. The same seed (*s*) with more of the fruit removed so that mesocarp, endocarp (*e*) and stylar-placental plug (*st*) are seen in section above. ×2·8.

Sheppey.

Laurocarpum sp. p. 186

12. A seed and endocarp with adherent patches of fruit-wall, side view. (*p*) cast of the placental aperture. ×2·8. V.30009.

Fig.

13. Another specimen more crushed than the preceding. ×2·8. V.30010.

Warden Point, Sheppey.

Corylopsis venablesi n.sp. p. 186

14. Holotype. Seed, side, showing deep narrow hilar depression (*h*). ×6·5. V.30012.

15. The same, opposite side, showing the facetting of the shining surface of the testa (*f*) at the hilar end of the seed. The groove (*g*) appears to be caused by splitting of the seed. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Corylopsis ? bognorensis n.sp p. 187

16. Holotype. Two abraded seeds protruding from the remains of the abraded fruit. (*s*, *s*) are the seeds, (*spt*) is the septum still lying between them, (*ch*) chalaza. ×6·5. V.30014.

17. Another seed. (*ch*) chalaza. The tegmen is exposed just above the chalaza. The endocarp is preserved on the left and there is a film of pyrites on the right. ×6·5. V.30015.

'Upper Fish Tooth Bed': Bognor, Sussex.

Corylopsis ? latisperma n.sp. p. 188

18. Holotype. A seed, side, showing facet (*f*) at the hilar end. ×6·5. V.30016.

19. The same, opposite side, showing the hilar scar (*h*). ×6·5.

20. The same, at right angles, (*f*) is the facet, the hilar scar is at (*h*) on the right hand side of the figure. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Hamamelidaceae. Genus ? p. 189

21. Seed, side, showing hilar scar at (*h*). × 6·5. V.30017.

22. The same, at right angles, showing the two facets (*f*,*f*) due to the large bilobed hilar scar. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Wetherellia variabilis Bowerbank p. 210

23. A coccus, ventral side, the plane of loculicidal splitting indicated by partial decay along the median longitudinal line (*m*). ×2·6. V.30018.

'Upper Fish Tooth Bed': Bognor, Sussex.

Leguminosae. Genus ? p. 190

24. A seed, side view, showing the hooked form. (*h*) hilar scar. ×1·9. V.30025. East Cliff shore, Herne Bay, Kent. (London Clay or possibly from older beds).

Explanation to Plate 19 *continued overleaf*

Fig.

Leguminosae. Genus ? p. 190

25. A seed showing the subcircular form and slightly flattened ventral margin on the right. ×1·9. V.30026. Warden Point, Sheppey.

Canticarya sheppeyensis Reid & Chandler p. 191

26. A carpel, side, attachment on the right. ×2·8. V.30027.

27. The same, ventral. The hilar scar (exposed on the seed within) and attachment of the carpel are at (*h*). ×2·8.

28. The same split so as to expose the seed (*s*). The hilar scar and attachment are on the right. The position as in Fig. 26 above with the carpel removed along the cracks seen in that figure. ×2·8.

Herne Bay, Kent.

Canticarya sp. p. 191

29. A somewhat crumpled and distorted carpel, side view. The ventral margin is on the right (the upper end is somewhat broken). ×6·5. V.30032.

'Upper Fish Tooth Bed': Bognor, Sussex.

Rutaspermum minimum n.sp. p. 191

30. Holotype. Seed, ventral (worn over the hilar scar so that the sharp edges of the scar are obliterated). (*h*) hilar aperture. (*m*) marks the level of the micropyle. ×6·5. V.30033.

31. The same, side. (*m*) the micropyle, (*h*) the position of the hilar opening, (*r*) the raphe canal, (*ch*) the position of the chalaza. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Fig.

Rutaspermum (Zanthoxylon?) bognorense n.sp p. 192

32. Holotype. A seed, side, hilum (*h*) on the right indicated by the truncation of the tranversely oval outline. ×6·5. V.30034. 'Upper Fish Tooth Bed': Bognor, Sussex.

Caxtonia glandulosa Reid & Chandler p. 193

33. Carpel (cast) enclosing a seed, looking onto the dehiscing ventral margin. The large cells of the testa with glistening contents are seen between the valves of the carpel. ×6·5. V.30035.

34. The same, side view, ventral margin to the right. ×6·5.

35. Another carpel, incomplete at the apex. Ventral margin to the right. ×6·5. V.30036.

36. The same after removal of one valve so as to expose the seed lying within the other one. The secreting cells of the testa are seen over most of the surface. Near the apex of the seed these cells have been removed at (*tg*) where the tegmen is exposed. × 6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

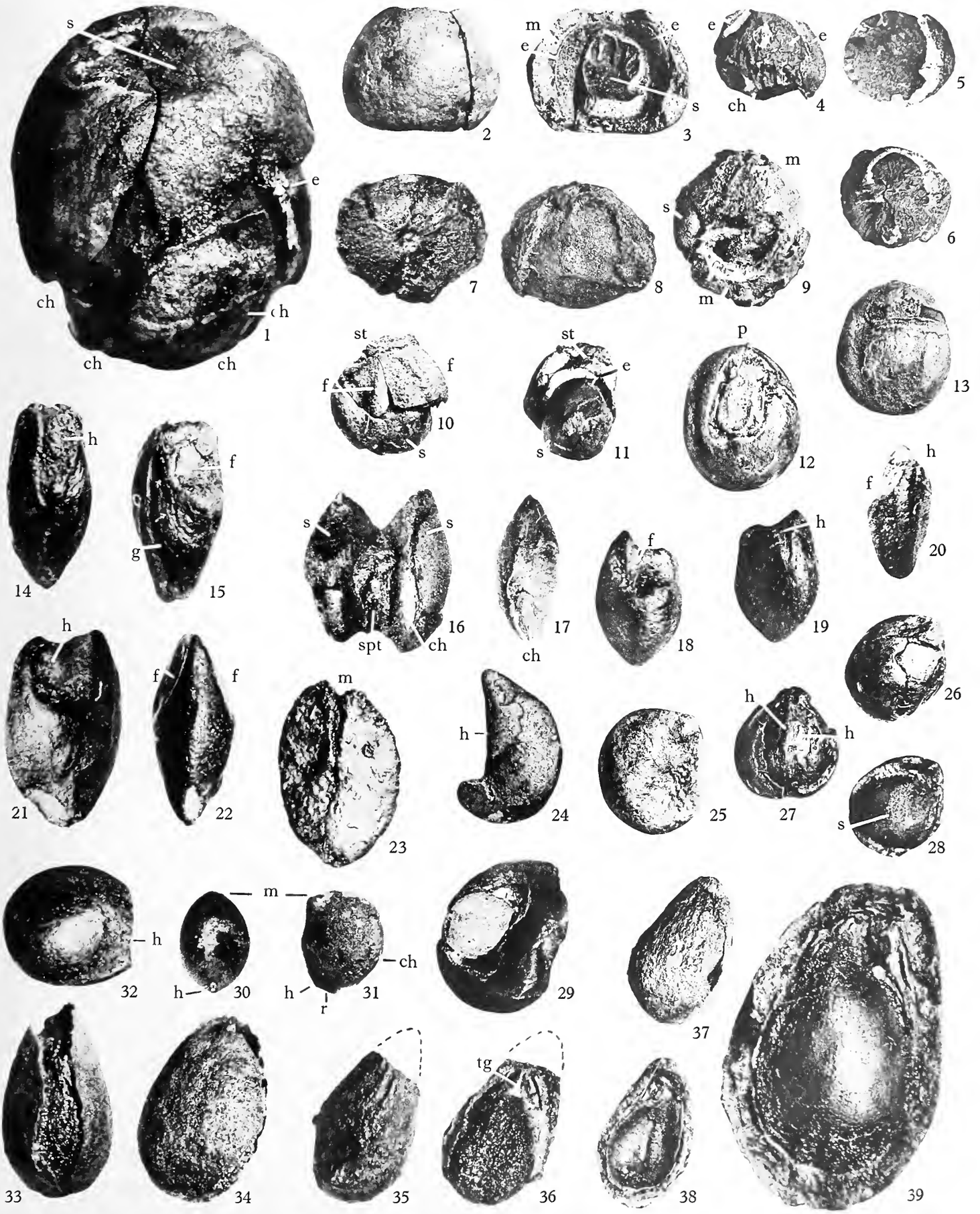
Caxtonia elongata n.sp. p. 194

37. Holotype. Carpel with epicarp abraded, side. Ventral margin on the right. ×2·8. V.30039.

38. The same with one valve removed and the seed exposed. ×2·8.

39. The same after further dissection showing the coarse testa cells with secretions and their impression on a film of pyrites. ×6·5.

Warden Point, Sheppey.



LAUROCARPUM, CORYLOPSIS, HAMAMELIDACEAE GENUS (?) WETHERELLIA, LEGUMINOSAE GENUS (?) CANTICARYA, RUTASPERMUM, CAXTONIA

Explanation of Plate 20

Fig.

Citrispermum sheppeyense n.gen. & sp. p. 195

1. Holotype. A seed, side, with part at least of the testa preserved over the chalaza (*ch*). The micropylar end (*m*) is not quite complete. ×6·5. V.30040.

2. Another seed, looking onto the chalazal end which is partly covered by testa. ×6·5. V.30041.

3. A third seed, looking onto the inner chalaza. The testa has been abraded exposing the circular chalaza scar. ×6·5. V.30041*a*.

   Herne Bay, Kent.

4. A seed, side, abraded at the chalazal end so as to expose the domed internal scar (*ch*). The testa is preserved in depressions of the surface on the sides of the seed. The hilar end (*h*) is imperfect. ×6·5. V.30042. Warden Point, Sheppey.

Protocommiphora europaea Reid & Chandler p. 196

5. An endocarp, dorsal surface, showing the germination valve (*v*), of the fertile locule and its curved lower limit. ×6·5. V.30051. 'Upper Fish Tooth Bed': Bognor, Sussex.

Bursericarpum aldwickense n.sp p. 196

6. Holotype. A pyrene, dorsal side showing outline of valve (*v*) with its curved lower margin. ×6·5. V.30054.

7. The same, ventral side, showing the median angle above the curved ventral aperture (*p*) associated with the placenta. ×6·5.

8. Another pyrene, broken at the apex and abraded so as to expose the locule-cast (*lc*) in the lower part. Ventral side. ×6·5. V.30055.

9. The same, dorsal side. The carpel wall is preserved above where it forms the germination valve (*v*). It shows the regular cells of the surface layer. (*lc*) locule-cast. ×6·5.

10. A well-preserved pyrene, ventral side, showing the form and curved aperture (*a*) associated with the placenta. ×6·5. V.30056.

11. Another pyrene broken on the left so as to expose the ventral surface of the seed with its curved chalazal band (*ch*) on its ventral surface about the middle. (*lc*) locule-cast remaining on the right, (*s*) seed-cast on the left. The apex is broken as indicated. The middle line is shown. ×6·5. V.30057.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Bursericarpum bognorense n.sp p. 198

12. Holotype. A pyrene, ventral side. It is partially covered by accrescent pyrites. ×6·5. V.30060.

13. The same, dorsal side, showing the curved lower limit (*l*,*l*) of the germination valve. ×6·5.

14. Another pyrene broken at the apex, side view. The ventral surface is to the right and shows the curved median placental aperture (*a*). The dorsal valve (to the left) has begun to gape above. Its lower limit is at (*l*). ×6·5. V.30061.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Fig.

Bursericarpum ovale n.sp. p. 199

15. Holotype. A pyrene, dorsilateral aspect. A ventrilateral facet is seen sloping away from the observer on the right. Carpel wall largely abraded. ×6·5. V.30064.

16. The same, side view, with the seed exposed in the lower half by chipping away the endocarp and locule-cast. Ventral side to the right. The indentation on the right indicates the position of hilum and placenta. Immediately below it is the oval chalazal scar (*ch*) lying on the small median facet The approximate lower limit of the dorsal germination valve is at (*l*). ×15.

17. The same, ventral side, with the specimen tilted a little towards the left so that the longitudinal axis lies asymmetrically as indicated by the line (*a*, *a*). The part of the specimen above the chalaza (*ch*) lies nearer to the camera and is a little out of focus. ×15.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Bursericarpum venablesi n.sp. p. 200

18. Holotype. Half a fruit consisting of two pyrenes (or of one two-seeded pyrene), dorsal surface showing two germination valves (*v*, *v*). ×6·5. V.30065.

19. The same, inner (ventral) face. ×6·5.

20. Locule-cast from the same, ventral side, showing the placenta about the middle. ×6·5.

21. A fruit showing the dorsal face of two of the pyrenes. The axis is prolonged into the peduncle. The outlines of the valves with their curved lower margins are clearly seen. The longitudinal mark to the right of the middle line is a flaw in the negative. ×6·5. V.30066.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Palaeobursera bognorensis n.gen. & sp. p. 202

22. Holotype. A pyrene, ventral, showing the upward curved placental aperture and narrow ventral angle. Below the placenta the carpel is chipped away and the seed exposed showing the downward curved chalazal scar (*ch*) immediately below the placenta (*p*). ×15. V.30068.

23. The same side with the ventral surface to the right, showing clearly the indentation associated with the placenta (*p*), and the curved chalazal scar (*ch*). ×15.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Toona sulcata (Bowerbank) p. 203

24. A stipitate fruit, exterior. ×2·8. V.30069.

25. The same, opposite (broken) side, showing the overlapping winged seeds at (*s*). ×2·8.

    'Upper Fish Tooth Bed': Bognor, Sussex.

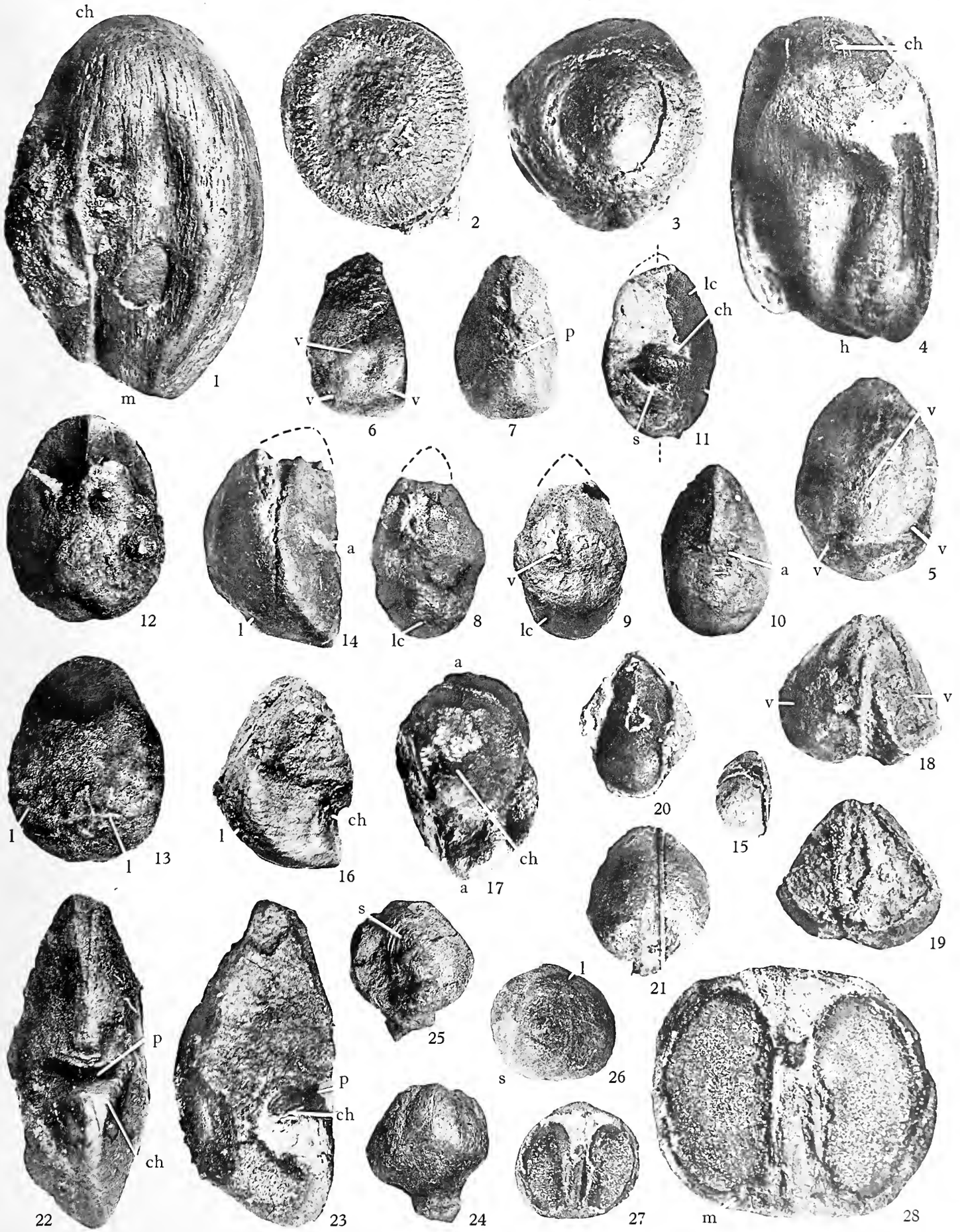
Euphorbiotheca minima n.sp. p. 203

26. Holotype. Fruit exterior showing obscurely the loculicidal (*l*) and septicidal (*s*) suture lines. ×6·5. V.30070.

27. The same, interior after longitudinal fracture, showing two seeds and the axis. ×6·5.

28. The same, interior counterpart of that in Fig. 27. The micropylar pointed end of one seed is visible at (*m*). The top of the axis is seen. ×15.

    Herne Bay, Kent.



CITRISPERMUM, PROTOCOMMIPHORA, BURSERICARPUM, PALAEOBURSERA, TOONA, EUPHORBIOTHECA

Explanation of Plate 21

Fig.

Euphorbiospermum eocenicum Reid & Chandler p. 205

1. Seed, hilar end, showing tendency to split into three. ×2·8. V.30071.

2. The same, opposite end, showing the chalaza (*ch*) through the partly abraded testa. ×2·8.

3. The same, side, with hilum at top of the picture. ×2·8.

4. Another seed somewhat crushed, hilar end. ×2·8. V.30072.

5. The same, chalazal end. (*ch*) is the chalaza. ×2·8.

6. A seed, hilar end, showing the three-partite splitting. ×6·5. V.30073.
Figs. 1–3 Herne Bay, Kent; Figs. 4, 5 Warden Point, Sheppey; Fig. 6 'Upper Fish Tooth Bed: Bognor, Sussex.

Euphorbiospermum cooperi n.sp. p. 206.

7. Holotype. Seed, side, showing angle of hilar facet (*f*) The ventral side is to the right. ×2. V.30075.

8. The same, ventral surface. (*d*) is merely an accidental indentation, seed incomplete on right. ×2.

9. The same, dorsal surface. The seed is slightly distorted so that the chalazal scar is visible at (*ch*). ×2·7.
Herne Bay, Kent.

Euphorbiospermum bognorense n.sp. p. 207

10. Holotype. Seed, side, looking onto ventral surface. The hilum is at (*h*), the chalaza at (*ch*). The hilar facets are at (*f*, *f*). ×6·5. V.30076.

11. The same, side, with ventral surface to the left. It shows the angle on the ventral side due to the hilar facets at (*f*). ×6·5.

Euphorbiospermum venablesi n.sp. p. 207

12. Holotype. A seed, somewhat larger and broader than *E. bognorense*, ventral surface. (*f*, *f*) are the hilar facets. ×6·5. V.30077.
'Upper Fish Tooth Bed': Bognor, Sussex.

Euphorbiospermum subglobulare n.sp. p. 208

13. Holotype. Seed, hilar end, showing angles of splitting. ×15. V.30079.

14. The same, side, showing cells. ×15.

15. Another seed, chalazal end. (*ch*) chalaza. ×15. V.30080.

16. The same, hilar end, showing the three angles. ×15.
'Upper Fish Tooth Bed': Bognor, Sussex.

Euphorbiospermum sp. p. 208

17. A seed, the concave surface. ×6·5. V.30082.

18. The same, opposite, convex surface. ×6·5.
Warden Point, Sheppey.

Fig.

? **Euphorbiospermum** sp. p. 209

19. A seed, side. ×6·5. V.30083.
Warden Point, Sheppey.

Dracontomelon subglobosum Reid & Chandler p. 212

20. Endocarp, apex, showing the apertures with plugs (*a*, *a*)· ×2·6. V.30087.

21. The same, side, showing small paired median apertures (*m*) as well as large apical apertures (*a*). ×2·6.

Dracontomelon minimum Reid & Chandler p. 212

22. Endocarp (broken at *b*), base, showing the locule-casts (*lc*) exposed by abrasion. ×2·6. V.30092.

23. Another, side, also abraded so that the locule-casts (*lc*) are exposed. ×2·6. V.30093.
'Upper Fish Tooth Bed': Bognor, Sussex.

Pseudosclerocarya lentiformis Reid & Chandler p. 212

24. The fruit in longitudinal section showing two locules with seed-casts (*lc*). The chalaza (*ch*) is seen on the left hand seed. The radial cells of the mesocarp are seen around the circumference of the fruit at (*m*). (*p*) marks the position of the germination plug which is clearly seen in the specimen. ×2·8. V.30099.

25. The same, apex. The large median hole is secondary and due to decay. ×1·8.

26. The same, base, with five-sided attachment scar. ×1·8.
Herne Bay, Kent.

Choerospondias sheppeyensis (Reid & Chandler) p. 214

27. An endocarp, side, showing narrow apical apertures (*a*). ×2·7. V.30101.

28. The same, base, showing attachment scar. ×2·7.

29. The same, apex, showing the five narrow apertures. ×2·7.

30. The same, base after fracture, to expose the seed as a result of which the basal attachment and narrow apertures surrounding it are better displayed through the flaking away of adherent pyrites. ×2·2.

31. A seed removed from the same endocarp, side. The chalazal scar (*ch*) is seen on the dorsal margin to the right. ×6·5. Herne Bay, Kent.

Lannea jenkinsi Reid & Chandler p. 215

32. An endocarp, side. ×6·5. V.30106.

33. Another, more abraded, in which the interspaces between the swirling strands of fibres are filled with amorphous pyrites. Aperture at (*a*). ×6·5. V.30106*a*.
'Upper Fish Tooth Bed': Bognor, Sussex.

Explanation to Plate 21 *continued overleaf*

Fig.

Lannea europaea Reid & Chandler p. 215

34. An abraded two-loculed endocarp, locules at (*l*, *l*). ×6·5. V.30114.

35. Another two-loculed endocarp showing the abraded pyrites-filled apertures leading into the locules at (*a*). ×6·5. V.30114*a*.

'Upper Fish Tooth Bed': Bognor, Sussex.

? **Lannea** sp. p. 216

36. A much abraded endocarp with locule and seed-casts partially exposed. (*ch*) is the chalaza. ×2·7. V.30119.

Herne Bay, Kent.

Spondiaecarpon operculatum n.sp. p. 216

37. Holotype. An endocarp showing the tissue at the upper end between the two locules. ×6·5. V.30115.

38. Another, more abraded, showing the valves or apertures at the upper ends of the locules (*a*, *a*), close to one another on this side of the endocarp (the opposite to that shown in the specimen in Fig. 37). The branching of fibres which can be traced from the groove between the two locules is discernible. ×6·5. V.30116.

39. Another endocarp (imperfect below), turned so as to display one of the apical apertures (*a*). Valve gone. ×6·5. V.30117.

'Upper Fish Tooth Bed': Bognor, Sussex.

Fig.

Anacardiaceae. Genus? p. 218

40. An endocarp, dorsal side, much abraded. ×6·5. V.30120.

41. The same, ventral side. The two locule-casts are partly exposed. The arrangement of the fibres suggests a median ventral attachment. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

42. A much abraded endocarp with locule-casts (*lc*) partly exposed. ×2·8. V.30121.

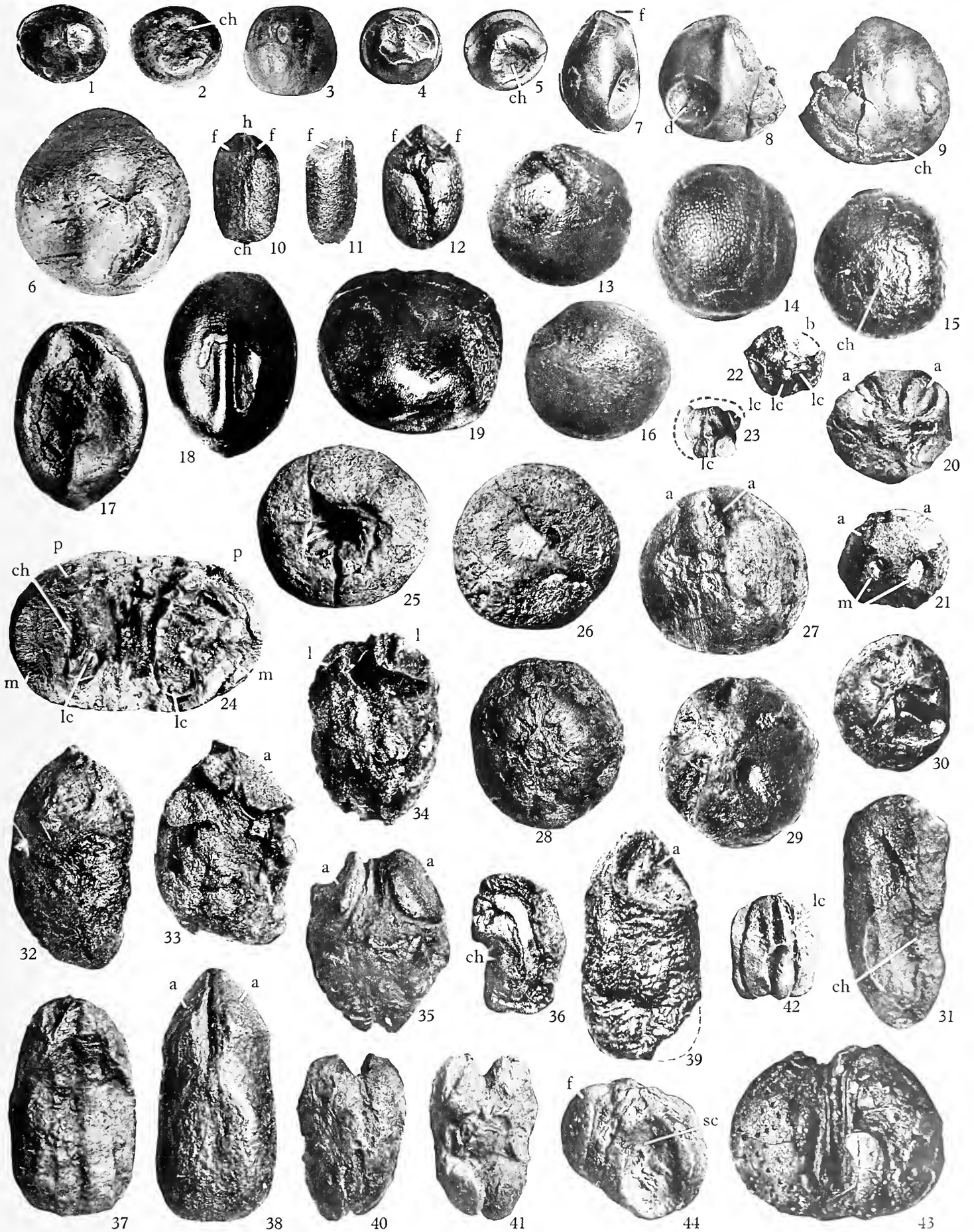
Herne Bay, Kent.

Lobaticarpum variabile Reid & Chandler p. 218

43. A fruit with two well-developed lobes. The external surface is preserved and shows circular pits associated with bristles or hairs. ×2·8. V.30123.

44. A fruit showing a lobe (or float) on the left at (*f*), and the scar (*sc*) where one has fallen away on the right of the axis. ×2·6. V.30124.

Fig. 43 Herne Bay, Kent; Fig. 44 'Upper Fish Tooth Bed': Bognor, Sussex.



EUPHORBIOSPERMUM, DRACONTOMELON, PSEUDOSCLEROCARYA, CHOEROSPONDIAS, LANNEA, SPONDIAECARPON, ANACARDIACEAE GENUS (?), LOBATICARPUM

Explanation of Plate 22

Fig.

Iodes corniculata Reid & Chandler p. 219

1. A perfect endocarp with carbonaceous coat perfectly preserved (never before seen). (*p*) marks the position of the placenta. ×2·7. V.30131.

2. A second similar specimen after removal of the cracking carbonaceous carpel (*c*) so as to expose the typical locule-cast (*l*) which is the form usually found. The placenta underlies the point (*p*). ×2·7. V.30132.

   Warden Point, Sheppey. *In situ.*

Iodes multireticulata Reid & Chandler p. 219

3. An endocarp with carbonaceous wall more or less perfect. ×2·8. V.30135.

4. Another endocarp with carbonaceous coat preserved. ×2·8. V.30136.

5. An endocarp much abraded but with the inner part of the carpel pyritized and adherent to the locule-cast. ×2·6. V30137.

   Fig. 3 Warden Point, Sheppey. Fig. 4 Herne Bay, Kent. Fig. 5 'Upper Fish Tooth Bed': Bognor, Sussex.

Iodes sp. (**I.multireticulata** ?) p. 220

6. A locule-cast. (*p*) marks the placenta. ×6·5. V.30139.

   'Upper Fish Tooth Bed': Bognor, Sussex.

Iodes davisi n.sp. p. 220

7. Holotype. Endocarp, side. ×2·7. V.30140.

8. The same, interior of the valve, somewhat cracked and decayed. ×2·7.

9. The seed out of the same endocarp, broken below, showing the raphe median on the lateral face. ×2·7.
   Bawdsey, Suffolk.

?**Iodes** sp. p. 221

10. An endocarp. ×2·7. V.30141.

11. The same, opposite side with carpel wall broken away above, showing the form of the locule-cast (*lc*). ×2·7.
    Herne Bay, Kent.

Palaeophytocrene foveolata Reid & Chandler p. 222

12. An endocarp abraded round the edges to show the typical locule-cast (*l*) with deep depressions due to ruminations. The surface of the endocarp is somewhat obscured by a film of pyrites. ×2·8. V.30142.

13. Opposite face of the same. ×2·8.

14. An abraded locule-cast (imperfect above) with fragment of adherent endocarp. ×2 V.30143.

15. A much abraded locule-cast. ×2·7. V.30144.

    Figs. 12, 13 'Upper Tooth Fish Bed': Bognor, Sussex. Fig. 14 'Beetle Bed': Bognor, Sussex. Fig. 15. Herne Bay, Kent.

Fig

Palaeophytocrene ambigua Reid & Chandler p. 222

16. A locule-cast broken at one end showing the rather sparse, large, funnel-shaped pits. ×2·7. V.30146.

    Division 2 Beds: Dump 1, Clapham Common.

Icacinicarya platycarpa Reid & Chandler p. 223

17. A worn endocarp. ×1·5. V.30149.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Icacinicarya foveolata Reid & Chandler p. 224

18. An endocarp, abraded so as to expose the funicle (*f*) in the upper part of its course, looking onto the funicle-bearing margin. ×2·5. V.30153.

19. The same, broad surface. The funicle (*f*) is to the right. ×2·5.

    Sheppey.

Icacinicarya sp. (**I.nodulifera**?) p. 224

20. External surface of one valve of an endocarp with coarse network of sunk fibres. ×2·7. V.30162.

21. The same, inner surface. The funicular canal lies in the thick wall on the right at (*f*). At (*st*) is the stylar canal or else one of the canals connecting the exterior with the vascular canal frequently associated with small horn-like projections in this family. ×2·7.

22. The seed from the same specimen. ×2·7.

    Warden Point, Sheppey.

Icacinicarya minima Reid & Chandler p. 225

23. Endocarp, apex. The funicular canal is to the right at (*f*). It branches at the apex in the centre of the picture. ×2·8. V.30163.

24. The same, side, with funicle to left at (*f*). ×2·8.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Icacinicarya reticulata n.sp. p. 225

25. Holotype. An endocarp, side, abraded to show the characteristic fibres. ×1·6. V.30167. Nr. Bishopstone.

26. The same, base, showing the marginal fibre and pair of stout branches which arise from it close to the attachment. ×1·6.

27. An almost unabraded endocarp of unusual subcircular form. The fibres can be seen only obscurely as they are embedded in the wall. One of the pair of branches arising near the attachment from the stout marginal fibre is seen at (*p*). ×2·8. V.30168. East Cliff shore.

28. An imperfect endocarp, broken to show the seed and locule-casts, and much abraded superficially to show the fibres at (*f*). ×1·6. V.30169. Bishopstone.

29. The same, base, showing the fibres and attachment. ×1·6.

Explanation to Plate 22 continued overleaf

Fig.

30. A seed, side. The hilum is at the top at (*h*). ×2·7 V.30170.

31. The same, opposite side, showing the raphe (*r*) and chalaza (*ch*). ×2·7.

32. The same, chalazal end. The raphe is seen at (*r*). ×2·7.

33. A fragment of endocarp in pyrites showing the branching fibres of the external surface standing out in relief owing to the abrasion of the carpel wall in which they were embedded. ×2·8. V.30171.

34. A locule-cast showing the funicle (*f*) embedded in a thin flange of endocarp which surrounds part of the margin and the apex of the cast. Stylar canal (cast) at (*st*). A fragment of the cast has chipped away at (*s*) exposing the seed within. ×2·8. V.30172.

Figs. 25–32 Herne Bay, Kent. Fig 33 Division 2 Beds: Dump 1, Clapham Common. Fig. 34 'Upper Fish Tooth Bed': Bognor, Sussex.

Icacinicarya forbesi n.sp. p. 227

35. Holotype. An endocarp, side. The depressions between the network of raised ridges have become filled with upstanding massses of pyrites. ×2. V.30180.

36. The same, opposite surface. ×1·3.

37. The same, margin. ×1·3.

Fig.

38. The same, endocarp in section. Internally owing to mode of preservation it merges into the pyrites locule-cast without showing a clear boundary. Externally the pyrites (*p*) filling the spaces between the ridges can be seen. ×6·5.

39. An abraded endocarp without adherent masses of pyrites as in the preceding specimen. ×1·5. V.30181.

40. The same, inner surface of one valve, showing the locule and part of the funicle (*f*). ×1·5

Warden Point, Sheppey. *In situ*.

Icacinicarya echinata n.sp. p. 228

41. Holotype. Locule-cast showing shallow depressions probably caused by projecting hair bases on the locule wall. Over the middle, part of the locule-cast is chipped away so that the seed (*s*) is exposed. ×2·7. V.30182.

42. The same specimen, opposite surface, with the inner layers of the endocarp preserved, showing pyrites casts of hair bases. The outer layers are seen in patches only, for example near the apex at (*e*). ×2·7.

Warden Point, Sheppey.

Icacinicarya emarginata n.sp. p. 229

43. Holotype. A locule-cast, side. (*p*) placenta, (*st*) style. ×2·7. V.30184.

44. The same, apex, showing placental depression. ×2·7.

Sheppey.

IODES, PALAEOPHYTOCRENE, ICACINICARYA

Explanation of Plate 23

Fig.

Icacinicarya amygdaloidea n.sp. p. 230

1. Holotype. Carbonaceous endocarp, side. (*p*) the placenta, (*f*) the margin which carries the funicle. ×1·7. V.30185. East Cliff shore.

2. The same, opposite surface. Lettering as in Fig. 1. ×1·9.

3. Another endocarp cracked and broken so that the locule, stylar canal, funicle (*f*), and placenta are exposed. The funicle is worn away except at the apex where it traverses the wall to the placenta. ×1·7. V.30186. East Cliff shore.

4. Fragment of the broken valve of the same endocarp, interior, showing the funicle near the apex as in Fig. 3 and the stylar canal at the tip of the specimen. (*p*) is the placenta, line indicates axis. ×1·7.

   East Cliff shore, Herne Bay, Kent. *In situ.*

Icacinicarya mucronata n.sp. p. 231

5. Holotype. A smooth surfaced endocarp. The carpel wall is broken away at the stylar end (*st*) and in part also below thereby showing the smooth locule-cast. ×2·8. V.30187.

   'Upper Fish Tooth Bed': Bognor, Sussex.

Icacinicarya glabra n.sp. p. 231

6. Holotype. Endocarp, side view. (*p*) marks the termination of the funicle at the placenta. ×2. V.30188.

   Warden Point, Sheppey.

Icacinicarya sp. p. 232

7. Endocarp, side. ×2·8. V.30190.

8. The same endocarp, opposite surface, with outer layers partly chipped away on the right hand side. ×2·8.

   Sheppey.

Icacinicarya sp. (**I.ovalis?**) p. 223

9. An endocarp. ×2·5. V.30588.

   Sheppey.

Icacinicarya sp. p. 233

10. An abraded endocarp. ×2·8. V.30191.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Palaeallophylus minimus n.sp. p. 233

11. Holotype. Seed-cast, side, showing radicle (*r*) and the folded cotyledons. The chalaza can be seen in the figure as an obscure transverse band at (*ch*). ×2·7. V.30197.

12. The same, looking onto the radicle. The tiny auricles are shown at (*a*) where the cotyledons arise from the radicle. ×2·7. In both figures the hilum is at the base of the photograph.

13. Another seed-cast with irregular patches of testa preserved. The radicle is to the left at (*r*). The curved cotyledons are seen, and the transverse band of the chalaza is visible at (*ch*). ×2·7. V.30918.

14. The same, looking onto the radicle. Adherent remains of testa are seen at the top of the figure and the inner layers of the testa cover the radicle. ×2·7.

    Herne Bay, Kent.

Fig.

Sapindospermum jenkinsi Reid & Chandler p. 235

15. A seed-cast, side, with radicle (*r*) to the left. The two superposed cotyledons are indicated by (c_1) and (c_2). (*g*) groove delimiting cotyledons. ×2·7. V.30202.

16. The same, looking onto the radicle around which adherent testa (*t*) can be seen especially on the left. The transverse furrow delimiting radicle from cotyledons is clearly seen. The groove (*g*) delimiting the cotyledons is continued along the radicle. ×2·7.

17. Another seed-cast, side, with radicle to the left. The line of demarcation between the two cotyledons (c_1) and (c_2) is clear. The radicle is slightly distorted. ×2·7. V.30203.

18. The same, looking onto the distorted radicle. ×2·7.

19. Another seed-cast, somewhat distorted, with radicle to the right (*r*). The junction between the cotyledons is clear. ×2·7. V.30204.

20. A seed-cast with adherent inner layers of testa which partly conceal the radicle and cotyledons. Looking onto the radicle. (*h*) is the hilar scar. The apex of the seed is broken. ×2·7. V.30205.

21. The same with radicle (*r*) to the right. (*h*) hilar scar. ×2·7.

    Herne Bay, Kent.

22. A seed with inner layers of testa preserved. The radicle (*r*) is on the left. Its tip is broken. The hilar scar (*h*) is much encrusted with pyrites. The form of the cotyledons is obscured by the adherent testa and cracked condition. ×2·7. V.30206.

    'Upper Fish Tooth Bed': Bognor, Sussex.

23. Seed-cast with adherent patches of testa, looking onto the small radicle (*r*). The lower cotyledon is seen beyond it at (c_2). ×2·7. V.30216.

24. The same, side, with radicle (*r*) to the right. (c_1) and (c_2) are the superposed cotyledons. ×2·7.

    East Cliff shore, Herne Bay, Kent.

Sapindospermum revolutum n.sp. p. 237

25. Holotype. A seed-cast, side, with radicle to the right at (*r*). ×2·8. V.30217.

26. The same, with radicle to the left showing the upper cotyledon (c_1) and the lower (c_2) folded back on itself. ×2·8.

27. The same, looking onto the radicle partly obscured by the inner layers of the testa. ×2·8.

28. Another seed-cast with remains of hilum and testa; looking onto the radicle. ×2·8. V.30218.

29. The same, side, with radicle (*r*) to the right. Its tip is obscured by the adherent testa and hilum (*h*). (c_1) is the upper cotyledon and (c_2) the reflexed lower cotyledon. ×2·8.

30. The same, side, with radicle to the left. (c_1) and (c_2) the cotyledons as before. × 2·8.

    Herne Bay, Kent.

Explanation to Plate 23 *continued overleaf*

Fig.

Sapindospermum cooperi n.sp. p. 238

31. Holotype. Seed, ventral side, tilted slightly to show the large hilar scar (*h*). ×2. V.30221.

32. The same, side with radicle (*r*) to the left. The oblique hilar scar at (*h*). ×2.

33. The same, dorsal side, looking onto the radicle (*r*). ×2·8.
Herne Bay, Kent.

Sapindospermum davisi n.sp. p. 239

34. Holotype. Seed with inner layers of testa preserved. Radicle (*r*) on the left, hilum at the base of the figure. The seed-cast (embryo) exposed at (*e*) where the testa has been chipped away. ×1·9. V.30222.

35. The same, side, with more of the testa chipped away to show the radicle (*r*) and cotyledons on the internal cast. The furrow between the two cotyledons is seen at (*f*). Remains of testa below. ×2·8.

Fig.

36. The same, opposite side, radicle to left (*r*), furrow at (*f*). ×2·8.

37. The same, looking onto the radicle. ×2·8.

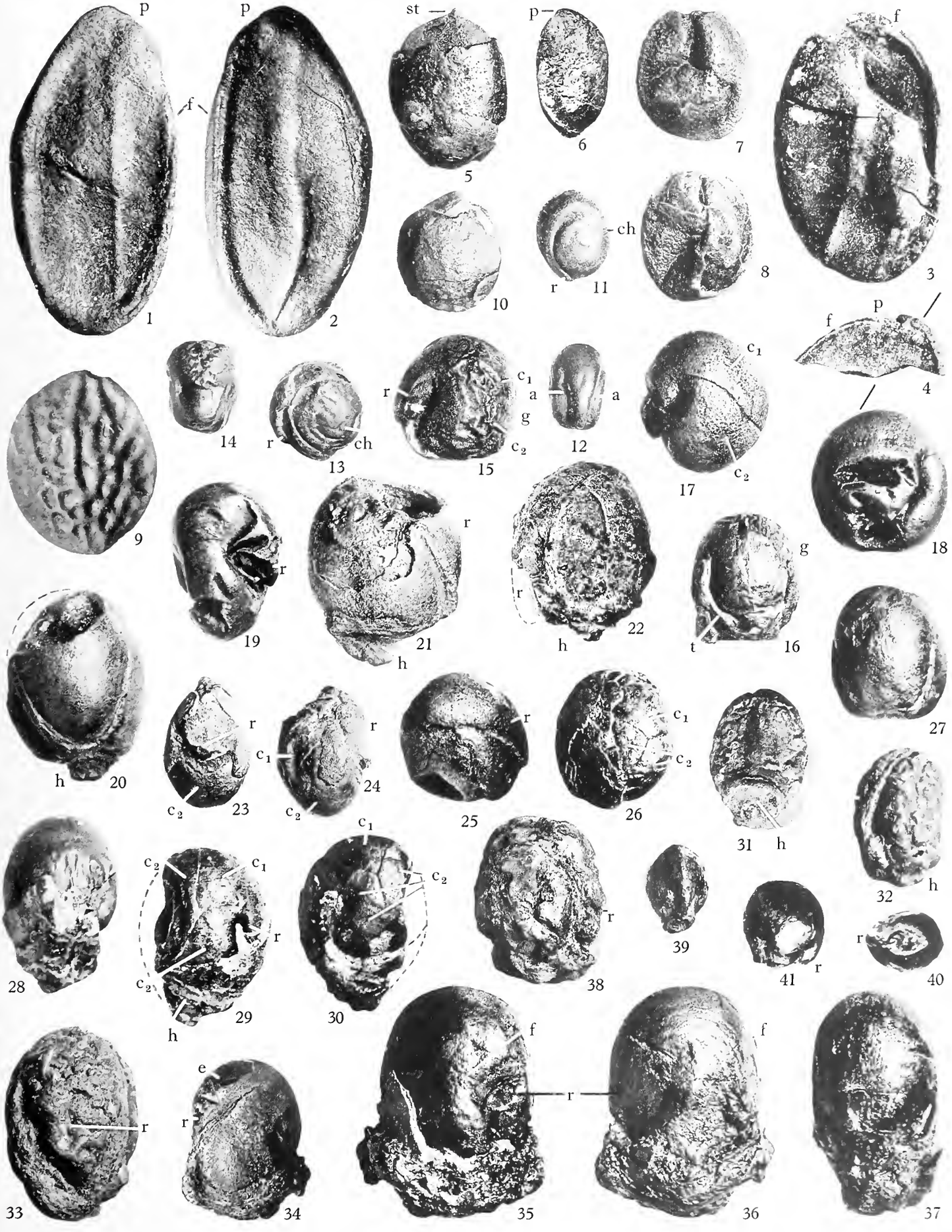
38. Another seed with much shrivelled testa, radicle at (*r*). ×1·9. V.30223.
Warden Point, Sheppey.

Sapindospermum sp. p. 241

39. A seed with testa preserved, looking onto the radicle. ×2·7. V.30224.

40. The same, hilar end showing the large hilar scar. Radicle to the left at (*r*). ×2·7.

41. The same, side, radicle to the right at (*r*). The hilar scar truncates the base. ×2·7.
Sheppey. *In situ*.



ICACINICARYA, PALAEALLOPHYLUS, SAPINDOSPERMUM

Explanation of Plate 24

Fig.

Sapindospermum sp. p. 242

1. A pyrites nodule (perhaps the internal cast of a fruit) in which several seeds (s_1, s_2) are embedded. ×1·8. V.30589.

2. The seed (s_1) in Fig. 1, showing the curved tapering radicle (*r*) and part of a cotyledon (*c*) beneath it and partially embraced by it. ×8·5.

Herne Bay, Kent.

Meliosma jenkinsi Reid & Chandler p. 242

3. An endocarp, ventral side, showing the somewhat fluted surface and hollow connected with the plug and attachment. ×2·8. V.30225.

4. Another specimen, ventral, with plug turned to the right and somewhat obscured by accrescent pyrites. ×2·7. V.30226.

5. The same, dorsal side. ×2·7.

6. A locule-cast, ventral side, of another specimen somewhat distorted and imperfect. ×6·5. V.30227.

7. A large locule-cast, ventral, tilted with the plug (*p*) to the right. ×2·8. V.30228.

Fig. 3 East Cliff shore, Herne Bay, Kent. Figs. 4–6 'Upper Fish Tooth Bed': Bognor, Sussex. Fig. 7 Frinton, Essex.

Meliosma cantiensis Reid & Chandler p. 242

8. A locule-cast, ventral (imperfect) looking onto the plug. ×6·5. V.30231.

9. A well-preserved and undistorted endocarp, ventral, looking onto the plug. ×6·5. V.30232.

'Upper Fish Tooth Bed': Bognor, Sussex.

Meliosma sheppeyensis Reid & Chandler p. 243

10. An endocarp, ventral, looking onto the plug. ×6·5. V.30239.

'Upper Fish Tooth Bed': Bognor, Sussex.

Bognoria venablesi n.gen & sp. p. 243

11. Holotype. An endocarp, side, with the ventral scar to the right. The slight excavation of the outline below is due to the incurving of the walls to form the basal aperture. ×2·8. V.30246.

12. The same, ventral side, showing the differentiated area or scar and the tongue-like prolongation which divides it. ×2·8.

13. The same, basal aperture. ×2·8.

'Upper Fish Tooth Bed': Bognor, Sussex.

Vitis subglobosa Reid & Chandler p. 245

14. A seed with testa preserved, dorsal side. Showing small sunk median somewhat abraded chalaza (*ch*). ×6·5. V.30247.

15. The same, ventral side, showing the short broad infolds (*i*). ×6·5.

16. Another seed with testa, dorsal, with chalaza (*ch*) unabraded. ×6·5. V.30248.

17. The same, ventral, showing infolds. ×6·5.

Figs. 14, 15 Warden Point, Sheppey. Figs. 16, 17 'Upper Fish Tooth Bed': Bognor, Sussex.

Fig.

Vitis semenlabruscoides Reid & Chandler p. 245

18. A seed with testa preserved, chalaza (*ch*). ×6·5.

19. The same, ventral, with infolds slightly divergent above. ×6·5.

20. Another seed with testa preserved, dorsal, showing very clearly the small sub-median chalaza. ×6·5. V.30249.

21. The same, ventral, with infolds. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Vitis bilobata n.sp. p. 246

22. Holotype. Seed with testa preserved, dorsal, with narrow median chalaza. ×6·5. V.30254.

23. The same, ventral, with short infolds. ×6·5.

24. The same, margin, the dorsal surface is to the right, the raphe ridge and an infold to the left. ×6·5.

Warden Point, Sheppey.

Vitis obovoidea n.sp. p. 247

25. Holotype. A perfect seed, dorsal, showing oval median chalaza. ×6·5. V.30255.

26. The same, ventral, showing parallel infolds occupying the lower three-quarters of the length of the seed. ×6·5.

27. Another specimen with the testa abraded, dorsal side, slightly distorted. ×6·5. V.30256.

28. The same, ventral, shortened by distortion. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Vitis magnisperma n.sp. p. 247

29. Holotype. Seed-cast, dorsal, with remains of testa much worn and polished. The external chalaza is abraded, but its large extent, as indicated by the size of the internal chalaza, is evident. ×6·5. V.30257.

30. The same, ventral, showing the infolds very clearly. ×6·5.

Sheppey.

Vitis venablesi n.sp. p. 248

31. Holotype. A seed, dorsal, with testa preserved and chalaza in the upper half of the seed. ×6·5. V.30258.

32. The same, ventral, with infolds in the lower part of the seed. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Vitis platyformis n.sp. p. 249

33. Holotype. Seed, dorsal, with testa complete but badly cracked, showing the small median chalaza and surrounding furrow. ×6·5. V.30260.

34. The same, ventral, showing the broad diverging infolds. ×6·5.

Warden Point, Sheppey.

Vitis elegans n.sp. p. 249

35. Holotype. A seed, dorsal, showing the large chalaza in the upper half. ×6·5. V.30261.

36. The same, ventral, showing the long divergent infolds. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

SAPINDOSPERMUM, MELIOSMA, BOGNORIA, VITIS

Explanation of Plate 25

Fig.

Vitis bracknellensis n.sp. p. 250

1. Holotype. Seed-cast, dorsal, in calcite with remains of carbonaceous testa. It shows the large median chalaza. ×6·5. V.30264.
2. The same, ventral, showing the long divergent infolds. ×6·5.
3. Another seed, ventral, with much polished testa. It shows the long divergent infolds. ×6·5.
4. A seed, dorsal, with testa preserved except over the large median chalaza. ×6·5. V.30265.
5. The same, ventral, showing the infolds. ×6·5.

Figs. 1, 2 Bracknell, Berkshire. Fig. 3 'Upper Fish Tooth Bed': Bognor, Sussex. Figs 4, 5 Warden Point, Sheppey.

Vitis sp. p. 251

6. Ventral side of half a seed lying in matrix. One infold and half of the raphe ridge on the right are shown. The testa was preserved. ×6·5. V.30266.
7. Ventral side of another seed similarly preserved. The left hand infold is shown. ×6·5. V.30267.

Bognor Soft Rock: Bognor, Sussex.

Vitis longisulcata (Reid & Chandler) p. 251

8. A seed-cast, dorsal, with remains of testa. ×6·5. V.30270.
9. The same, showing flattened ventral surface with long divergent infolds. ×6·5.
10. Typical seed-cast, dorsal, on which the fine flutings around the chalaza are seen. ×6·5. V.30271.
11. The same, ventral. The infolds are full of pyrites. ×6·5.
12. A seed-cast, dorsal, showing the flutings around the chalaza. ×6·5. V.30272.
13. The same, ventral, showing the two facets of the ventral surface and long divergent infolds. ×6·5.
14. Seed, dorsal, with testa preserved. The flutings around the chalaza can be seen. The seed is damaged at the top left hand side. ×6·5. V.30273.
15. The same, ventral side. A few flutings abutting on the infolds are visible. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Vitis rectisulcata n.sp. p. 252

16. Holotype. A seed-cast, dorsal . ×6·5. V.30279.
17. The same, ventral, showing the broad straight infolds. ×6·5.
18. Another smaller seed-cast probably of this species, dorsal· ×6·5. V.30280.
19. The same, ventral. ×6·5.

Warden Point, Sheppey. *In situ.*

Vitis rectisulcata? p. 253

20. A seed with testa preserved, dorsal surface, partly encrusted with pyrites. ×6·5. V.30281.
12. The same, ventral. The infolds appear broader than those of *V.longisulcata* (cf. Fig. 15) but resemble it in their upward divergence. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Tetrastigma davisi n.sp. p. 253

22. Holotype. A seed, dorsal, showing chalaza and radial ridges and furrows. ×6·5. V.30282.
23. The same, ventral, showing facetting and sharply angled raphe ridge, also the divergent infolds and radial ridges. ×6·5.

Warden Point, Sheppey.

Tetrastigma corrugata n.sp. p. 254

24. Holotype. Seed-cast, dorsal, with scanty remains of testa. The oval deeply sunk chalaza, deeply channelled apex, and rounded radial lobes are clearly shown. ×6·5. V.30283.

Fig.

25. The same, ventral, showing the sharp raphe ridge, and the ventral infolds which are indicated by (*i, i.*) ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Tetrastigma sheppeyensis n.sp. p. 255

26. Holotype. Seed-cast, dorsal, hilar end slightly imperfect. ×6·5. V.30285.
27. The same, ventral. ×6·5.

Warden Point, Sheppey. *In situ.*

Tetrastigma? elliotti n.sp. p. 255

28. Holotype. Seed, dorsal, with remains of testa. ×6·5. V.30284.
29. The same, ventral, showing the angled raphe ridge extending throughout the whole length of the seed, and the divergent infolds dying out well above the base. ×6·5.

Warden Point, Sheppey.

Ampelopsis monasteriensis Kirchheimer p. 256

30. A seed with testa preserved, dorsal, showing large chalaza in the upper half of the seed. ×6·5. V.30286.
31. The same, ventral, showing unequally developed facets, and short infolds. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Ampelopsis turneri n.sp. p. 256

32. Holotype. Seed with testa preserved, dorsal, showing narrow oval chalaza just above the middle, and slight radial crenulations of the surface. ×6·5. V.30288.
33. The same, ventral, showing the facets and marked angle of the raphe ridge, also the short infolds. ×6·5.

Sheppey.

Parthenocissus monasteriensis (Reid & Chandler) p. 257

34. A seed-cast, dorsal, imperfect around the chalaza. ×6·5. V.30289.
35. The same, ventral, showing sharp median angle of raphe ridge and infolds not extending to the apex of the seed. ×6.5.
36. A typical seed, dorsal, with abraded remains of testa. × 6·5. V.30290.
37. The same, ventral, showing median angle, and infolds. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Parthenocissus jenkinsi n.sp. p. 258

38. Holotype. A seed, dorsal, showing the chalaza. The surface is much obscured by accrescent pyrites. ×6·5. V.30295.
39. The same, ventral, showing the long divergent infolds. ×6·5.

Warden Point, Sheppey.

Palaeovitis paradoxa Reid & Chandler p. 259

40. A seed, dorsal. ×2·9. V.30297.
41. The same, base, showing the great degree of inflation, The ventral side towards the base of the figure, (*ch*) the chalaza. ×2·9.
42. The same, ventral, showing short infolds (*i*). ×2·9.
43. Another much inflated seed, dorsal. (*ch*) the chalaza. ×2·7. V.30298.
44. The same, ventral, showing infolds. Raphe ridge partly concealed by pyrites. ×2·7.

Figs. 40–42 Warden, Sheppey. Figs. 43, 44 Warden Point, Sheppey.

VITIS, TETRASTIGMA, AMPELOPSIS, PARTHENOCISSUS, PALAEOVITIS

Explanation of Plate 26

Fig.

Cantitilia lobata n.sp. p. 260

1. Holotype. Fruit, base. ×2. V.30306.

2. The same, side. ×2.

3. The same, apex. ×2.

4. The same, fractured longitudinally, showing a ripe seed on the left (*s*), the distorted curved axis (*a*) to the right of it, and to the right of the axis a locule with three abortive seeds (s_1, s_2, s_3). ×6·5.

5. The other half (counterpart) of the same fruit. The impressions of the abortive seeds on the left, of the ripe seed (*s*) on the right where an impression of another abortive seed (s_4) can also be seen. ×6·5.

6. The seed removed from the fruit tilted to show the circular chalazal scar (*ch*). ×6·5.

7. Another less distorted fruit, side. ×2·8. V.30307.

Warden Point, Sheppey.

Tetracera eocenica Reid & Chandler p. 261

8. A well preserved seed with testa, looking onto the radicular prominence (*r*). (*h*) is the hilum. ×6·5. V.30310.

9. A somewhat smaller seed, more abraded than the last. ×6·5. V.30311.

'Upper Fish Tooth Bed': Bognor, Sussex.

Tetracera crofti n.sp. p. 262

10. Holotype. A large seed, ventral surface, with testa abraded over the radicle (*r*). (*h*) is the hilum. ×6·5. V.30590.

11. The same, side. Radicle at (*r*), hilum at (*h*). ×6·5.

Herne Bay, Kent.

Hibbertia bognorensis n.sp. p. 262

12. Holotype. Seed, side, with testa preserved in part. The radicular prominence is at the highest point of the figure. ×6·5. V.30318.

13. The same, looking onto the radicle which is to the left, its tip directed towards the centre of the figure. Hilar scar at centre, chalaza (*ch*) on the right showing as a rounded scar seen in profile. ×6·5.

14. The same, turned through a right angle and tilted to show the chalazal scar (*ch*). The radicle is in the upper half of the figure. The chalaza is only partially uncovered and therefore it appears lobed. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Dilleniaceae. Genus? p. 263

15. Seed-cast, looking onto the chalazal area (*ch*) with micropyle at the top of the figure. (*h*) the hilum. ×6·5. V.30319.

16. The same, side. Chalaza to the right, hilum at (*h*). ×6·5.

Sheppey.

Dilleniaceae? Genus? p. 264

17. Seed-cast, side. The prominence (*p*) marks the radicle. ×6·5. V.30320.

Barrow Brook, Sheppey. *In situ*.

Fig.

Oncoba variabilis (Bowerbank) p. 264

18. Lobed placental mass, side, tilted to show the apex. ×2·1. V.30321.

19. Fruit with exocarp preserved, side, showing the transversely aligned bases of superficial recurved hooks (now abraded) at (*b*). ×2. V.30586.

20. Part of the surface on the opposite side of the same fruit where the hooks themselves are preserved. They are seen on the right in profile sharply recurved towards the base. ×3.

Fig. 18 'Upper Fish Tooth Bed': Bognor, Sussex. Figs. 19, 20 Swale Cliff, Herne Bay, Kent.

Saxifragispermum spinosissimum Reid & Chandler p. 265

21. A four-valved fruit, side, abraded so that the placentation of the seeds (or seed-casts) is displayed. ×2·75. V.30324.

22. Another similar fruit, side. (*p*) is a very clearly exposed placenta. ×2·7. V.30325.

East Cliff shore, Herne Bay, Kent.

Tamesicarpum polyspermum Reid & Chandler p. 266

23. Cast of a fruit, side. The fruit wall persists in the grooves between the lobes. Peduncle and inferior calyx are seen below at (*p*). The seeds with their coarse cells are impressed on the cast. ×15. V.30333.

'Upper Fish Tooth Bed': Bognor, Sussex.

Cranmeria trilocularis Reid & Chandler p. 267

24. A well preserved fruit with its outer layers removed by abrasion. ×2·5. V.30347.

25. The same, a different aspect, with part of the carpel wall chipped away exposing seeds (*s*) in one of the locules. ×2·5.

26 .The same in transverse section showing the three locules and projecting axile placentas. The septa are indicated by (*s*, *s*, *s*). Numerous seeds in each locule can be seen. ×2·7. Sheppey.

Palaeobruguiera elongata n.gen & sp. p. 269

27. Holotype. A viviparous embryo separated from calyx and fruit. The radicular end is rounded (incomplete?) and at the base of the figure. At the other end is a circular scar with a prominence (*p*) which represents the plumule. The epidermis was preserved in places. ×1·7. V.30348.

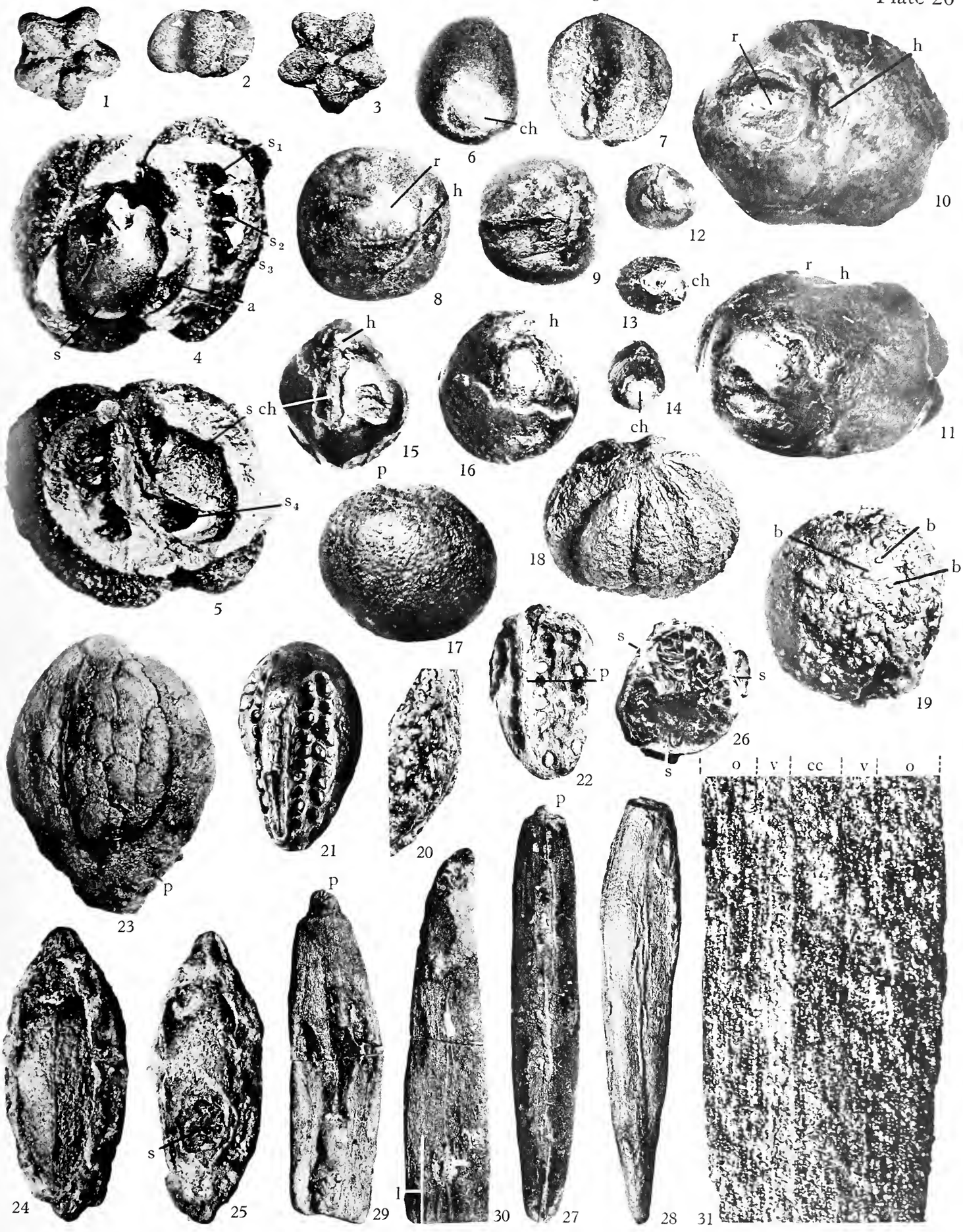
28. Another specimen with radicular end more pointed. ×1·8. V.30349.

29. A third specimen imperfect at the radicular end. It was fractured transversely to show the structure. (*p*) indicates the enlarged plumule. ×1·7. V.30350.

30. The plumule end of another large specimen sectioned longitudinally along the line (*l*), also transversely to show the structure. ×1·7. V.30351.

31. The section seen along the line (*l*) in the preceding specimen. (*o*) the outer cylinder of tissue, (*cc* and *v*) the central core, (*v*) being the outer cylindrical area of the core in which traces of vascular tissue can be detected. In the outer cylinder (*o*) the rows of rounded cells are a conspicuous feature in the figure. ×1·5.

Herne Bay, Kent.



CANTITILIA, TETRACERA, HIBBERTIA, DILLENIACEAE GENUS (?), ONCOBA, SAXIFRAGISPERMUM, TAMESICARPUM, CRANMERIA, PALAEOBRUGUIERA

Explanation of Plate 27

Fig.

Palaeobruguiera lata n. sp. p. 270

1. Holotype. A viviparous embryo, slightly imperfect at the radicular end, with circular scar and projecting remains of the plumule (*p*) at the other end. ×1·6. V.30352.

2. The plumule end of another specimen, fractured longitudinally and transversely to show the structure. ×1·7. V.30353.

3. The same in longitudinal section. (*o*) outer cylinder of cells within the thin epidermis, (*s*) cylinder of inflated cells arranged in rows like beads, (*cc*) is the central cylinder. ×15.

   Swale Cliff, Herne Bay, Kent.

Alangium jenkinsi n.sp. p. 272

4. Holotype. Endocarp, with part of the dorsal wall of one locule chipped away exposing a calcite seed-cast (*s*). ×2·8 V.30357.

5. The same, opposite surface, showing the other locule (*l*) exposed by the removal of the dorsal wall in fossilization. ×2·8.

   Herne Bay, Kent.

Nyssa cooperi n.sp. p. 274

6. Holotype. An endocarp, side. ×2·8. V.30371.

7. The same, fractured longitudinally, showing the calcite seed-cast (ventral surface). ×2·8.

   Herne Bay, Kent.

Nyssa sp. p. 275

8. An endocarp, dorsal, abraded so as to expose the locule-cast at the circumference of the specimen. The form of the dorsal germination valve is indicated by the curved outline near the apex. ×2·8. V.30358.

   'Upper Fish Tooth Bed': Bognor, Sussex.

Nyssa sp. p. 276

9. A locule-cast, dorsal, with remains of endocarp. The germination valve is indicated by the contracted outline at (*v*) and at the corresponding point on the opposite margin. ×6·5. V.30359.

10. A locule-cast with remains of endocarp and adherent pyrites. ×6·5. V.30360.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Nyssa sp. p. 276

11. A locule-cast, dorsal, showing the longitudinal ridges and furrows and the triangular area near the apex which suggests a dorsal germination valve. ×2·7. V.30361.

12. The same, ventral, showing the median longitudinal funicle. ×2·7.

    Herne Bay, Kent.

Palaeonyssa multilocularis Reid & Chandler p. 276

13. A three-loculed endocarp abraded so as to expose the locule-casts at the upper end. The outline of the germination valve (*v*) is clear on the locule-cast shown in the figure. The transverse fibres of the inner layers of the endocarp are seen below at (*t*). ×6·5. V.30366.

    'Beetle Bed': Bognor, Sussex.

Fig.

Palaeonyssa sp. p. 277

14. An abraded imperfect endocarp, side, showing two locule-casts. ×2·7. V.30368.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Durania stonei (Reid & Chandler) p. 292

15. A perfect fruit showing the accrescent calyx, free sepals (*s*) arising from the margin of an apical perianth disc, and tapering base passing into the peduncle (*p*). ×2·3. V.30451.

16. A fruit somewhat abraded. ×2·6. V.30452.

17. The same, upper half, after longitudinal and transverse fracture. The locule-casts (*l*, *l*) are seen protruding below from the upper half of the fruit, and to the left of them, and close beside them, is the cast of the axial canal (*a*) somewhat displaced by the pressure of the developed locules. ×2·6.

18. Upper half of the same endocarp as seen in transverse section, showing the lunate areas which correspond with longitudinal valves. Splitting occurred along the longitudinal angles of the fruit (cf. Text-fig. 42). The axial canal, in section, is seen as a small triangular light coloured area. The locules are in shadow and cannot be distinguished individually in the figure. ×2·6.

19. The same, lower half in transverse section, showing the valves of the endocarp, two locule-casts (as in Fig. 17) and the triangular axial canal in transverse section above them. ×2·6.

20. Detached seed and locule-cast from the same fruit, dorsal. The broad flanges at the top end of the figure are adherent locule-cast. The dorsilateral longitudinal raphe-fibres are in the lower half immediately to the right of the dark shadow on the left side of the seed. ×6·5.

21. Another short, broad fruit, apex, showing perianth disc. ×2. V.30453.

22. The same, base. ×2.

23. The same, side, much abraded. ×2.

24. The same, longitudinally fractured to show a locule-cast and seed. ×2·5.

25. The same, counterpart half. ×2·5.

26. A small abraded fruit partly broken on the right. The abrasion of the pericarp segments or valves exposes the rarely preserved transverse and oblique thin-walled dissepiments embedded in amorphous pyrites to which they owe their preservation. ×2·3. V.30454.

27. The same, fractured surface, showing the locule-casts at the centre and outside them, to the left, in section the thin dissepiments in the pericarp segment (valve). ×2·3.

28. An unusually broad inflated fruit. ×1·75. V.30455.

29. A small abortive fruit with large worn and pyrites-encrusted perianth disc at the upper end. ×2·8. V.30456.

30. A curved fruit somewhat abraded. ×2·8. V.30457.

    Herne Bay, Kent.

Fig. 15 East Cliff shore: Figs. 26–28 Swale Cliff.

PALAEOBRUGUIERA, ALANGIUM, NYSSA, PALAEONYSSYA, DURANIA

Explanation of Plate 28

Fig.

Hightea elliptica Bowerbank p. 277

1. Fruit exterior, side, slightly imperfect on the right below. ×2·8. V.30372.
2. The same, opposite side where the columella is exposed by removal in fossilization of the outer wall. A seed is seen at (*s*). ×2·8.
3. A large detached columella, side, tilted to show the apex. ×2·8. V.30373.
4. A detached seed, dorsal, from another fruit. The dorsi-lateral raphe is seen at (*r*), the flattening of the surface in the upper part of the seed is apparent. ×6·5. V.30374.

'Upper Fish Tooth Bed': Bognor, Sussex.

Aldwickia venablesi n.gen. & sp. p. 278

5. Holotype. A fruit, exterior, showing the rim of the apical aperture. ×2·7. V.30378.
6. Counterpart half of the same, broken below. It shows the seeds (*s*) and outer edges of the columella (*c*) projecting between them. ×2·8.
7. The same as in Fig. 5 after removal of columella and seeds, interior showing fruit cavity with impressions of the seeds and outer edges of the columella. ×2·7.
8. The detached columella from the same fruit. A cavity in which a seed lay (corresponding with the locule) is seen at (*l*). The fibres of the columella are clearly shown. ×6·5.
9. A detached secd from the same fruit, ventral side, with the hilar flange preserved. (*h*) hilum, (*m*) micropyle, (*ch*) chalaza. ×6·5.
10. Another of the seeds, (*h*) hilum (the hilar flange is mostly broken away), (*m*) micropyle, (*ch*) chalaza. × 6·5.
11. Part of a fruit, outer surface, tilted to show apical aperture. The free part of the perianth above appears to have broken away at the constriction of the fruit. ×2·75. V.30379.
12. Abraded detached columella with adherent seeds. ×2·75. V.30380.

Figs. 5–10 'Upper Fish Tooth Bed': Bognor, Sussex. Fig. 11 Herne Bay, Kent. Fig. 12 Sheppey.

Palaeeucharidium cellulare Reid & Chandler p. 281

13. A much abraded three-loculed three-sceded fruit, side. ×6·5. V.30381.
14. A fruit, exterior, side. ×6·5. V.30382.
15. A seed from the fruit in Fig. 14. fractured transversely to show the coarse celled testa in section. The ventral side is below. ×6·5.
16. A rare five-loculed five-seeded fruit, base. ×2·7. V. 30383.
17. The same, apex. ×2·7.
18. The same, side. ×6·5.
19. Another three-loculed fruit sectioned longitudinally showing the broad axis, a septum on the right, and a seed (partly sectioned) on the left. ×6·5. V.30384.
20. A detached seed, ventral surface, showing the broad longitudinal median groove below. ×6·5. V.30385.

'Upper Fish Tooth Bed': Bognor, Sussex.

Mastixia cantiensis Reid & Chandler p. 282

21. A fruit with exocarp (broken on the left). ×1·9. V.30389.
22. The same, turned to show the endocarp and locule-cast (*lc*) on the fractured surface. ×1·9.
23. An abraded endocarp which has lost its valve. The space formerly occupied by the valve is on the right at (*v*). ×2. V.30390.
24. An abraded endocarp, side. ×2·6. V.30391.
25. The same, opposite side. ×2·6.

Fig.

26. The same, transversely fractured, showing the locule-cast (*lc*) in section and the infold on the valve (*v*). ×2·6.

Figs. 21, 22 East Cliff shore, Herne Bay, Kent. Figs. 23–26. 'Upper Fish Tooth Bed': Bognor, Sussex.

Mastixia parva Reid & Chandler p. 283

27. A well-preserved rugose endocarp, side. ×2·8. V.30398.
28. An endocarp, ventral side, somewhat more abraded than the preceding. ×2·7. V.30399.
29. The same, dorsal side, looking onto the valve. The median infold of the valve has begun to split and is filled with pyrites. ×2·7.
30. An endocarp. ×2·7. V.30400.
31. The same, transversely fractured to show the U-shaped locule-cast. (*v*) the valve with infold. ×2·7.

Fig. 27 Warden Point, Sheppey. Figs. 28, 29 East Cliff shore, Herne Bay, Kent. Figs. 30, 31 'Upper Fish Tooth Bed': Bognor, Sussex.

? **Mastixia** sp. p. 283

32. A carpel, dorsal side. (*o*) an organ? ×2·8. V.30407.
33. The same, ventral side. ×2·8.

Warden Point, Sheppey.

Beckettia mastixioides Reid & Chandler p. 284

34. A two-loculed endocarp, side, tilted to show the apex with characters which recall *Cupressinites curtus* Bower. (Reid & Chandler, 1933 : 96). ×2 approx. V.30410.
35. An endocarp, side, tilted to show the apex of a valve facing the camera. ×1·8. V.30411.

Fig. 34 Sheppey. Fig. 35 'Upper Fish Tooth Bed': Bognor, Sussex.

Lanfrancia subglobosa Reid & Chandler **p.** 285

36. A three-loculed endocarp with carbonaceous wall in decaying condition ×2·8. V.30415.
37. An abraded three-loculed endocarp in which locule-casts (*lc*) are partially exposed. ×2·8. V.30416.
38. The same, apex, showing three locules with locule-casts partly exposed (labelled 1, 2 and 3). ×2·8.

Fig. 36 Warden Point, Sheppey. Figs. 37, 38 'Upper Fish Tooth Bed': Bognor, Sussex.

Portnallia bognorensis n.gen. & sp. p. 285

39. Holotype. An abraded endocarp, side view, tilted slightly to show the apex. A locule-cast (*lc*) is exposed facing the camera. ×6·5. V.30421.
40. Base of the same showing the three locule-casts and septa. The outer wall is completely destroyed. ×6·5.
41. Another specimen with more of the endocarp wall preserved. ×6·5. V.30422.
42. Apex of a four-loculed endocarp abraded so that the locule-casts are partly exposed. ×2·8. V.30423.
43. A two-loculed endocarp with external walls preserved, apex. ×2·8. V.30424.
44. The same, side. ×2·8.

Figs. 39–42 'Upper Fish Tooth Bed': Bognor, Sussex. Figs. 43, 44 Warden Point, Sheppey.

Portnallia sheppeyensis n.sp. p. 286

45. Holotype. A much abraded four-loculed endocarp, side. Locule-casts are exposed at (*lc*). ×6·5. V.30428.
46. The same, apex, showing that three out of the four locule-casts (*lc*) are partly exposed. ×6·5.

Sheppey.

HIGHTEA, ALDWICKIA, PALAEEUCHARIDIUM, MASTIXIA, BECKETTIA, LANFRANCIA, PORTNALLIA

Explanation of Plate 29

Fig.

Portnallia sheppeyensis n.sp. p. 286

1. A two-loculed endocarp, locule-casts partly exposed by abrasion, looking onto the carpel wall between two locules (*l*, *l*). ×6·5.. V.30429.

2. The same, looking onto one of the partly exposed locule-casts. ×6·5.

3. A three-loculed endocarp, apex. The specimen is abraded, the valves (*v*, *v*) are beginning to gape at the apex. The furrows between the locules are seen. ×2·7. V.30430.

Figs. 1, 2 Sheppey. Fig. 3 Swale Cliff, Herne Bay, Kent.

Dunstania multilocularis Reid & Chandler p. 288

4. A five-loculed fruit in transverse section embedded in a shelly septarian fragment. One locule (*lc*) is abortive. Ovoid secreting cavities are seen in the thickness of the wall. ×6·5. V.30433.

5. Five-loculed endocarp, apex, showing apical depression. ×1·8. V.30434.

6. The same, base. Five narrow pyrites filled slits are exposed by abrasion, they alternate with the locules. ×1·8.

7. The same, side, showing apical depression (*a*) and valves of the endocarp (*v*). ×1·8.

8. Another five-loculed endocarp, abraded so that the ovoid glandular cavities are exposed in the thickness of the valve (*v*). The surface elsewhere is much encrusted with pyrites. ×2·7.

9. A locule- and seed-cast, showing the flattening on the dorsal side where formerly overlain by the valve, to the right at (*v*). The depressions on the lateral surface facing the camera are impressions of the ovoid secreting cavities. The seed-cast (*sc*) is exposed on the ventral side (to the left). ×6·5.

10. An endocarp, exterior, side. (*a*) the apical depression. ×6·5. V.30435.

11. The same, fractured longitudinally, showing two of the locules and the ovoid secreting cavities in the sectioned walls. (*a*) as before. ×6·5.

Fig. 4 Bracknell, Berkshire. Figs. 5–9 'Upper Fish Tooth Bed': Bognor, Sussex. Figs. 10, 11 Bawdsey, Suffolk.

Leucopogon quadrilocularis Reid & Chandler p. 289

12. An endocarp, somewhat imperfect above. ×6·5. V.30441.

13. The same, opposite side, showing parts of three of the four locules. ×6·5.

14. An endocarp, side, looking onto locule-cast exposed by removal of the dorsal wall of the locule in fossilization. ×6·5. V.30442.

15. The same, opposite surface, looking onto the locule. Dorsal wall and locule-cast are both broken away. ×2·8.

16. The same, apex, the side with locule-cast is at the bottom of the figure, the empty locule at the top. ×2·8.

Figs. 12, 13 Frinton, Essex. Figs. 14–16 'Upper Fish Tooth Bed': Bognor, Sussex.

Symplocos trilocularis Reid & Chandler p. 290

17. Side of endocarp, tilted a little to show (obscurely in shadow) the apical depression at (*a*). ×2·8. V.30446.

Fig.

18. The same, fractured longitudinally (straight line marks axis), showing pyrites filled apical depression (*a*), locules with seeds, and the tissues of the carpel. ×2·8.

19. A four-loculed endocarp, abraded so that the locule-casts are more or less completely exposed. They show the expanded part (*e*) above where the pendulous abortive seeds lay, and the terete part below occupied by the ripe fertile seeds (*s*). ×6·5. V.30447.

Sheppey.

Symplocos sp. p. 291

20. A broken endocarp, side, (*l*, *l*) locules, (*s*) seed fragments, (*c*) axial canal. ×6·5. V.30449.

Warden Point, Sheppey.

Symplocos (?) **bognorensis** n.sp. p. 291

21. Holotype. A fruit, exterior. ×6·5. V.30450.

22. The same, fractured longitudinally, showing columnar endocarp (*e*) surrounding locules two of which can be seen each enclosing one seed. ×6·5.

23. The counterpart half, showing the two seeds (*s*), one in each locule. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.

Cucurbitospermum sheppeyense n.sp. p. 295

24. Holotype. A perfect seed. (*h*) the hilar scar. ×6·5. V.30463.

25. A seed, internal cast, convex side. The raphe (*r*) is along the left hand margin, (*h*) the hilum, (*m*) the micropyle, (*ch*) chalaza. ×6·5. V.30464.

26. The same, opposite flat surface. ×6·5.

Fig. 24 Warden Point, Sheppey. Figs. 25, 26 'Upper Fish Tooth Bed': Bognor, Sussex.

Cucurbitospermum equilaterale n.sp. p. 296

27. Holotype. A perfect seed showing the flange on both sides at the hilar end (*h*). ×6·5. V.30469.

28. An abraded seed showing pyrites casts of the hilum and micropyle at the narrow end. ×2·8. V.30470.

'Upper Fish Tooth Bed': Bognor, Sussex.

Cucurbitospermum cooperi n.sp. p. 297

29. Holotype. Valve of seed, exterior, imperfect at the chalazal end. (*h*) hilar scar. ×6·5. V.30472.

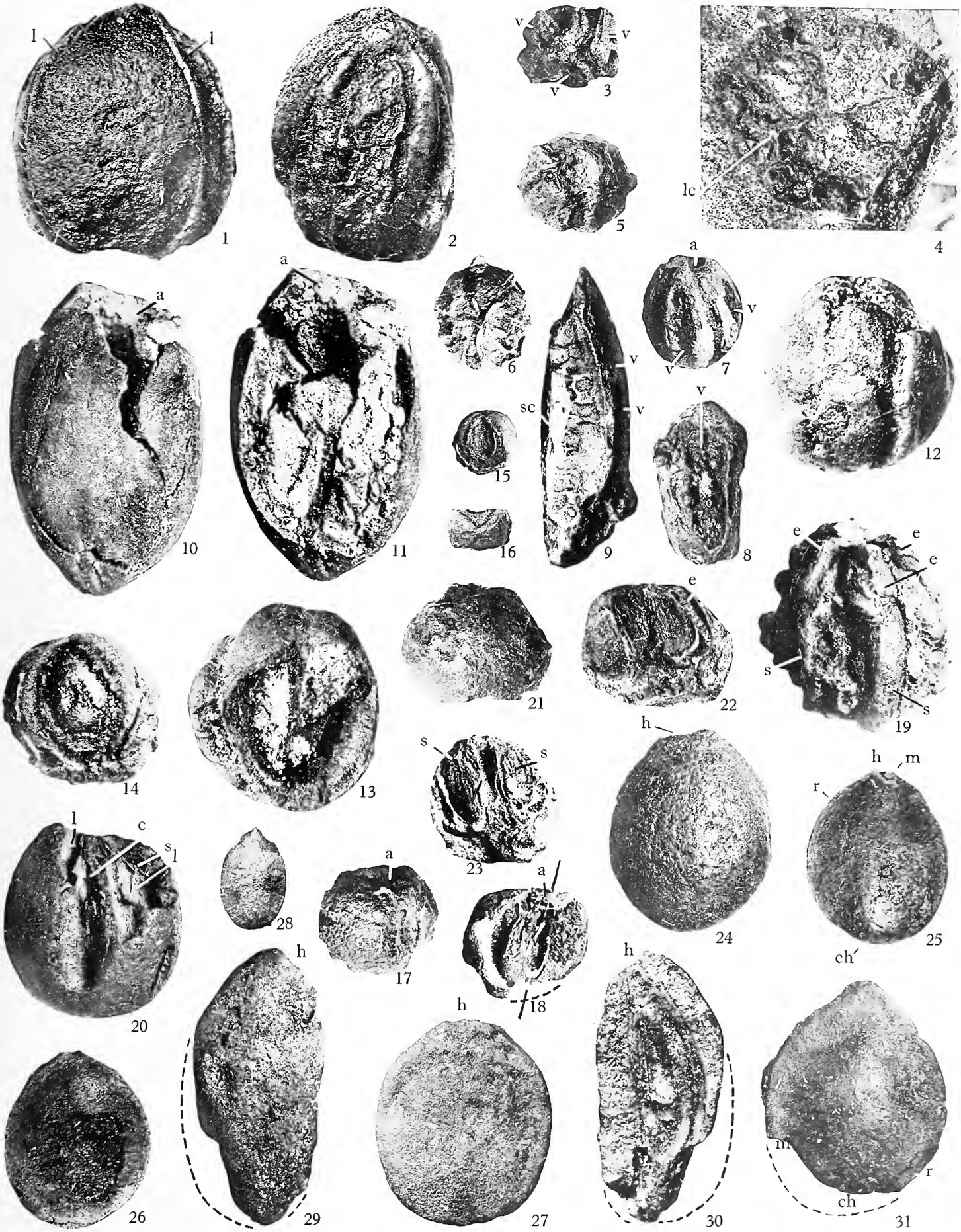
30. The same, interior, showing seed-cast, thick testa and hilum (*h*). ×6·5.

Herne Bay, Kent.

Cucurbitospermum triangulare n.sp. p. 297

31. Holotype. A seed showing the somewhat pointed hilar end, the rounded chalazal end and marginal rim originally extending all round the seed (broken in fossilization at (*m*) and the chalazal end). The position of the chalaza (*ch*), not seen, is at the extreme base of the figure. The raphe canal is exposed by abrasion at (*r*). ×6·5. V.30473.

'Upper Fish Tooth Bed': Bognor, Sussex.



PORTNALLIA, DUNSTANIA, LEUCOPOGON, SYMPLOCOS, CUCURBITOSPERMUM

Explanation of Plate 30

Fig.

Jenkinsella apocynoides Reid & Chandler p. 298

1. A locule-cast, dorsal, with an impression of a displaced winged seed (*s*) and indications of horizontally placed seeds at (*h*). The specimen was later fractured transversely to show the arrangement and character of these seeds. ×6·5. V.30474.

2. The same after transverse fracture showing the winged seeds (*s*, *s*) lying transversely one upon another in two rows. Ventral suture at (*v*). The dorsal surface (*d*) is seen out of focus with indications of the outer edges of the seeds lying one upon another. ×16.

3. Another fragment of the same in transverse section. ×16.

4. A similar specimen, dorsal, with the impression of a less well-developed seed (*s*). ×2·7. V.30475.

5. A fruit with carpel wall preserved showing the longitudinal strands of fibres and transverse cells between them. ×6·5. V.30476.

6. Another fruit (incomplete) showing the ventral margin and suture for dehiscence (*vs*). ×2·7. V.30477.

7. A locule-cast, ventral, slightly imperfect at each end. ×2·7. V.30478.

Figs. 1–6 Herne Bay, Kent. Fig. 7 Frinton, Essex.

Polycarpella caespitosa Reid & Chandler p. 301

8. Part of a capitulum, looking onto the free apices of the fruitlets. ×6·5. V.30483.

9. The same, sectioned, showing the attachment of the fruitlets to a placenta. ×6·5.

Herne Bay, Kent.

Leyrida bilocularis Reid & Chandler p. 301

10. A fruit with a dorsal valve removed exposing an empty locule. ×6·5. V.30484.

11. Another with a dorsal valve removed exposing a locule-cast or seed. ×6·5. V.30485.

12. An endocarp with two fertile and one abortive locule (an unusual feature). ×2·7. V.30486.

13. The same in transverse section. (*f*, *f*) fertile locules. The abortive locule (*al*) shows obscurely. ×2·7.

Figs. 10, 11 'Upper Fish Tooth Bed': Bognor, Sussex. Figs. 12, 13 Herne Bay, Kent.

Neuroraphe obovatum Reid & Chandler p. 301

14. A seed embedded in a coat of pyrites which causes the specimen to resemble a shrivelled berry. ×2. V.30488.

15. The same, sectioned longitudinally, shows the seed-cast. The testa, broken into short lengths owing to contraction, is seen at (*t*, *t*). ×2.

Herne Bay, Kent.

Lagenoidea trilocularis Reid & Chandler p. 210

16. A fruit fractured longitudinally. It shows the funicle (*f*) and the suspension of the pendulous seed. ×2·7. V.30491.

Warden Point, Sheppey.

Lagenoidea bilocularis Reid & Chandler p. 211

17. Fruit fractured longitudinally showing the pendulous anatropous seed. (*f*) the funicle, (*r*) the raphe, (*ch*) the chalaza. ×6·5. V.30493.

Herne Bay, Kent.

Fig.

Lagenella alata Reid & Chandler p. 302

18. A fruit with the basal end and peduncle (*p*) well-preserved. ×2·7.

19. The same, viewed at right angles. The seeds lie parallel with this surface. ×2·7.

'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus scalariformis Reid & Chandler p. 303

20. A perfect valve, interior, somewhat obscured about the middle by accrescent pyrites. ×2·8. V.30506.

Warden Point, Sheppey.

Carpolithus pusillus (Reid & Chandler) var. **latus** nov. p. 304

21. Holotype. A carpel, ventral, showing the plug (*p*) and sinuous ridges on the surface. ×6·5. V.30509.

22. The same after removal of the plug, showing the ventral aperture. ×6·5.

23. The same, dorsal. It shows well the "beak" (*b*) perhaps associated with the micropyle and radicle (cf. Figs. 25–27.) ×6·5.

24. The same, side, ventral aperture to the left. ×6·5.

25. The same, seed-cast after the carpel wall has flaked away, ventral showing large median aperture and marked terminal beak. Inside the aperture the rounded chalaza scar can be seen at the bottom of the hollow. ×6·5.

26. The same, dorsal. ×6·5.

27. The same, lateral, with the ventral aperture to the right. × 6·5.

28. A locule-cast with remains of inner layers of carpel still adhering, ventral. ×6·5. V.30510.

29. The same, dorsal, showing the longitudinal dorsal furrow. ×6·5.

Figs. 21–27 Warden Point, Sheppey. Figs. 28, 29 'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus pusillus var. **elongatus** nov. p. 306

30. Holotype. A seed-cast showing the chalaza in the ventral hollow (a light coloured circular scar). ×6·5. V.30512.

31. The same, dorsal, showing the median longitudinal groove and row of rounded apertures. ×6·5.

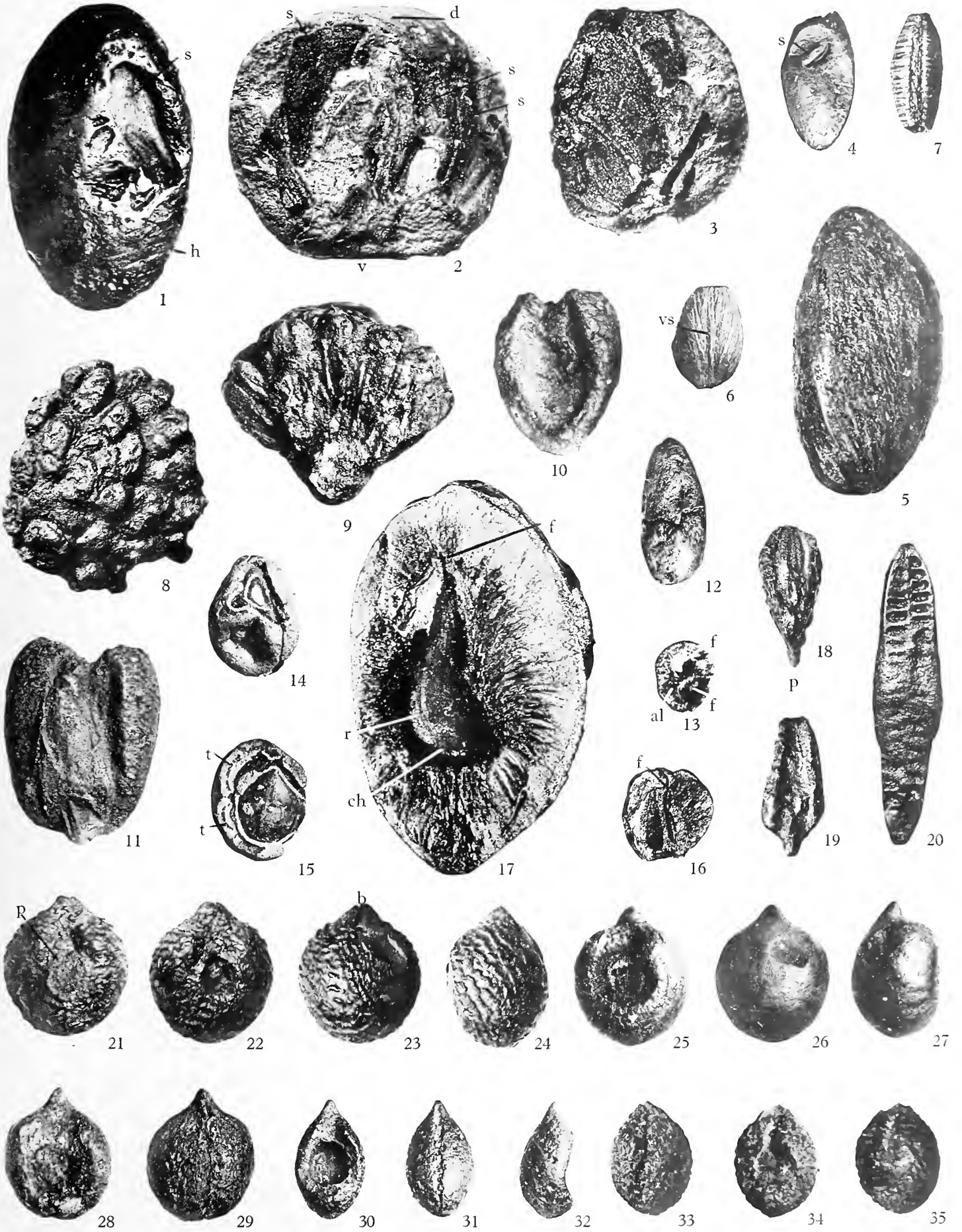
32. The same, side, with ventral hollow to the right. ×6·5.

33. A carpel with carbonaceous coat preserved, dorsal, showing median groove with its row of rounded apertures. ×6·5. V.30513.

34. The same, ventral. The pointed end is slightly imperfect. The ventral opening is seen. ×6·5.

35. The same, differently lighted and focused, to show the ornament of sinuous ridges. ×6·5.

'Upper Fish Tooth Bed': Bognor, Sussex.



JENKINSELLA, POLYCARPELLA, LEYRIDA, NEURORAPHE, LAGENOIDEA, LAGENELLA, CARPOLITHUS

Explanation of Plate 31

Fig.

Carpolithus pusillus var. **ornatus** nov. p. 307

1. Holotype. A carpel, ventral, showing attachment and the deep channel between the ventral plug and beak (micropylar end of seed with radicle, *m*). ×6·5. V.30516.

2. The same, dorsal, showing the conspicious median ridge and the oblique ridges which flank it, also the finer sinuous ridges which cross them. ×6·5.

3. The same, side, ventral surface to the right. The radicular beak is at (*r*). The prolongation of the oblique ridges from the dorsal to the ventral surface is shown. ×6·5.

4. The same, opposite side, with ventral surface to the left. The projecting mass at (*p*) is accrescent pyrites which is also shown in Figs. 1 and 2. ×6·5.

5. A larger endocarp, dorsal, much abraded. The beak-like radicle is broken. ×6·5. V.30517.

6. The same, ventral, much battered and abraded. The median ventral plug can be detected in the figure at (*p*). ×6·5.

7. Longitudinal section along the line of fracture seen in Fig. 5. The ventral hollow and plug are seen on the right in section. ×6·5.

   Warden Point, Sheppey.

Carpolithus gracilis (Bowerbank) p. 309

8. A three-lobed cast. ×2·7. V.30520.

   'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. 33 (?**C. gracilis**) p. 309

9. A three-lobed internal cast, side. ×2·7. V.30522.

10. The same, end view. ×2·7.

11. The same in transverse section showing the three locule-casts and septa. ×6·5.

    Herne Bay, Kent.

Carpolithus sp. 50 p. 310

12. A fruit, locule-cast with film of carbonaceous substance. (*s*) the suture line, indicating longitudinal dehiscence, now occupied by a ridge of pyrites. The fruit wall and cast are broken in the lower half and the chalazal end of the seed (*ch*) protrudes at the base. ×2·7. V.30530.

13. The same, with more of the locule and its cast removed displaying the seed more or less completely. (*f*) remains of fruit-cast, (*s*) the seed, (*ch*) the chalaza of the seed. ×2·7.

14. The same with more of the fruit wall replaced in position around the seed. (*f, f*) is the wall in section, (*ch*) the chalaza of the seed. ×2·7.

15. The same seed with all of the fruit wall removed. It shows the crumpled surface (due to contraction), the pointed hilar-micropylar end (*hm*). The large slightly convex chalazal scar (*ch*) its limits indicated by oblique dotted lines. ×6·5.

    West Cliff, Herne Bay, Kent.

Fig.

Carpolithus sp. p. 310

16. A long narrow loculicidal valve of a fruit. The rugose external surface is to the left, the flat locule in shadow to the right. ×2·7. V.30531.

17. The same, looking onto a locule with impressions of three seeds. ×2·7.

    Warden Point, Sheppey.

Carpolithus sp. p. 311

18. Abraded fruit, side, with curved placental opening in profile on the right. ×6·5. V.30534.

19. The same, ventral, with placental opening at (*p*) in the median line. The groove (*g*) in the plane of symmetry indicates a tendency to split along this line. ×6·5.

20. The same, longitudinal section in upper part, showing two gall-like bodies. ×6·5.

21. Same, section completed showing gall-like bodies fully exposed. ×6·5.

    Warden Point, Sheppey.

Carpolithus sp. p. 311

22. Fruit, side. The shining outer coat is preserved at the base but chipped away above. The median longitudinal furrow marking the edge of the septum is shown, also the rim (*r*) surrounding the apical depression. ×6·5. V.30535.

23. The same, opposite side. ×6·5.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. p. 312

24. A detached carpel from a two-carpelled syncarpous fruit, dorsal. ×6·5. V.30536.

25. The same, ventral, with remains of the median axis of the fruit at (*a*). ×6·5.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. p. 312

26. A detached carpel or locule-cast from a two-carpelled fruit, dorsal, showing deep longitudinal furrow. ×2·8. V.30537.

27. The same, ventral, showing median ridge and small knobs, marking the placentae? (*p*). ×2·8.

    Warden Point, Sheppey.

Carpolithus sp. p. 313

28. A cast, side, with basal aperture. ×2·6. V.30538.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. p. 313

29. Endocarp, side, attachment to the right. ×2·8. V.30539.

30. The same, ventral, showing the long narrow aperture associated with the attachment. ×2·8.

Explanation to Plate 31 *continued overleaf*

Fig.

31. The same, longitudinal section, showing the curved seed and thickened chalaza (*ch*) at the base of the ventral hollow. ×2·8.

    Herne Bay, Kent.

Carpolithus sp. p. 313

32. Locule-cast with longitudinal rugosites. ×2·7. V.30540. Swale Cliff, Herne Bay, Kent.

Carpolithus sp. p. 314

33. Three-loculed cast with remains of adherent carpel wall above. The groove between two of the locules is seen in a median longitudinal position in the figure. ×2·7. V.30541.

34. The same, upper half, after fracture to expose seeds within the locule-cast. Three seed-bodies (*b*) can be seen with wings above each, wing also seen partially embracing the left hand seed on its left side at (*w*). (Cf. Text-fig. 50) where coarse cells can be seen. The stout fibre (*r*) probably represents a raphe on the opposite side of a seed to its wing. ×6·5.

    Herne Bay, Kent.

Fig.

Carpolithus sp. p. 315

35. A woody fruit battered and abraded retaining the fruit wall (*f*) around the margin, the locule and seed-cast being exposed over the broad surface. ×2·8. V.30543.

    Frinton, Essex.

Carpolithus sp. p. 316

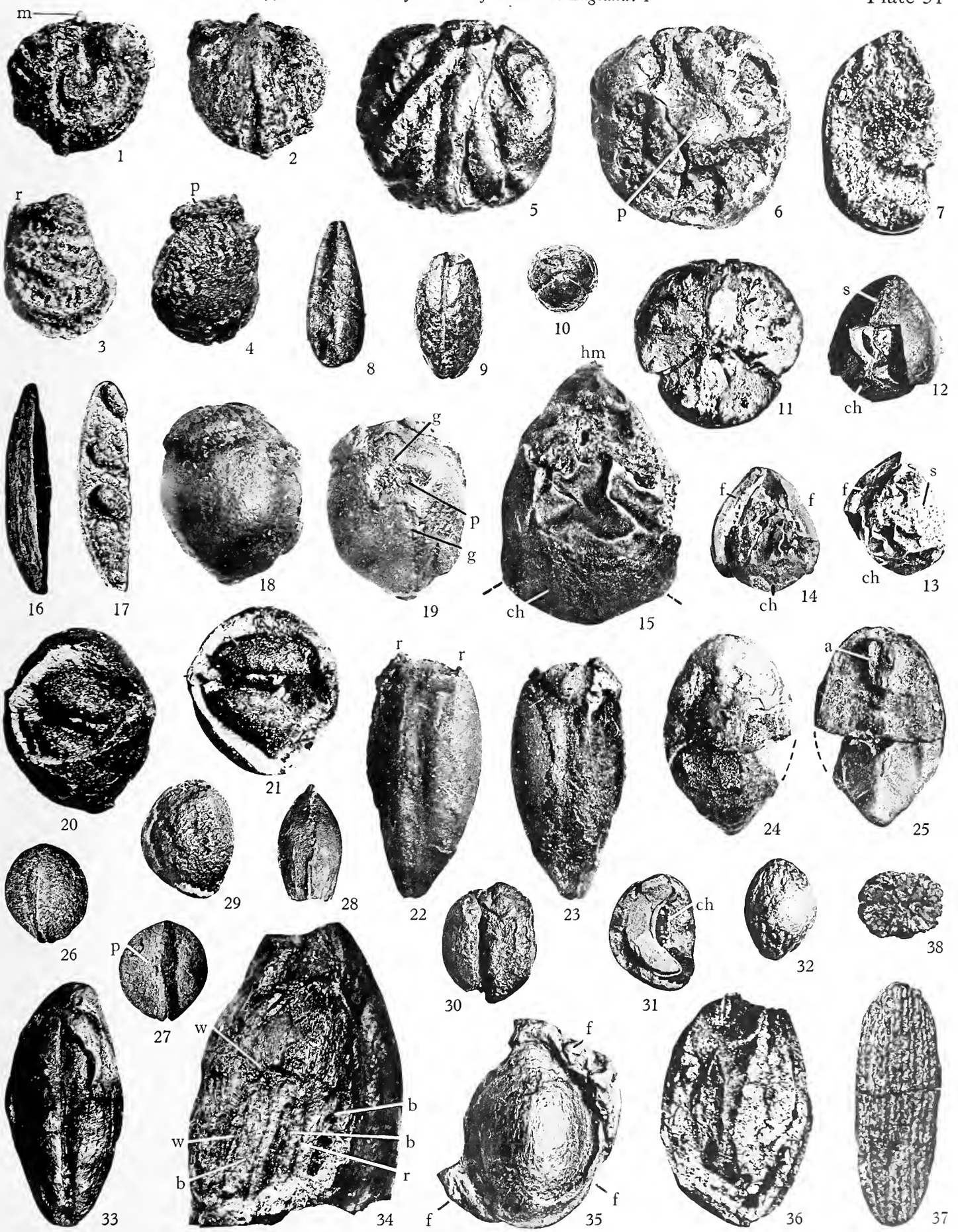
36. Endocarp in longitudinal section showing the solitary pendulous seed (seen partly in section). ×6·5. V.30544.

    Herne Bay, Kent.

Carpolithus sp. p. 316

37. Seed-cast showing the ruminate albumen. ×2·8. V.30545.

38. The same in transverse section to show the radial ruminations of varying depth (cf. Text-fig. 51). ×2·7.
    Swale Cliff, Herne Bay, Kent.



CARPOLITHUS

Explanation of Plate 32

Fig.

Carpolithus sp. p. 317

1. A fruit, imperfect at one end, where a seed (*s*) is exposed ×6·5. V.30546.

   'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. p. 317

2. An endocarp, side. ×2·7. V.30547.

3. The same, looking onto the right hand margin in the previous figure. ×2·7.

4. The same, with part of the carpel wall removed to display the large chalazal scar (*ch*) on the seed within. ×2·7.

   Warden Point, Sheppey.

Carpolithus sp. p. 318

5. A compressed fruit showing the terminal style? (*st*) and the small tubercles representing the pyrites infillings of short radial canals in the exocarp. ×2·7. 30548.

   Warden Point, Sheppey.

Carpolithus sp. p. 318

6. A carpel looking onto the ventral surface from which a large valve appears to have come away so that a locule is exposed. The patch of tissue (*p*) may represent a placenta. ×2·8. V.30549.

7. The same, side, ventral surface and placenta? (*p*) to the left. ×2·8.

   'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. p. 318

8. Fruit (there is a longitudinal fracture along the crack seen in the figure). ×2·7. V.30550.

9. The same in longitudinal section along the crack in Fig. 8 showing the fertile locule communicating above with one of the apical apertures at (*a*) by the narrow canal (*c*). The lateral angle of the locule is apparent at (*l*). An abortive locule is indicated at (*ab*). For the position of the chalaza on the solitary seed see Text-fig. 52. ×6·5.

   Herne Bay, Kent.

Carpolithus sp. p. 319

10. A flat surface of the triangular organism. ×6·5. V.30551.

11. One of the angles. ×6·5.

12. Transverse section showing triangular form. ×6·5.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. p. 320

13. A seed. ×6·5. V.30553.

14. The same, opposite face, with chalazal scar (*ch*). ×6·5.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Fig.

Carpolithus sp. p. 320

15. Internal cast of fruit showing the deep longitudinal furrow on one face and the transverse ripple-like ridges on both sides of it. ×6·5. V.30554.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. p. 320

16. Fruit or seed with the outer coat abraded at the upper end showing the internal cast inside at (*c*). ×6·5. V.30555.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. p. 321

17. Fruit or endocarp, fractured longitudinally in the upper part to show two locules and a fibrous axis. ×6·5. V.30556.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. p. 321

18. Fruit, side, tilted to show the large flat scar of attachment. It also shows the ribs, perhaps forming two two-ribbed valves on the face towards the camera. ×2 approx. V.30557.

19. The same, opposite end, showing the roughly triangular form and rounded ribs perhaps forming two valves on each face. Dotted lines indicate margins of valves. ×2 approx.

    Hampton shore, Herne Bay, Kent.

Carpolithus sp. p. 322

20. Fruit, apex, showing the sharp angle and bisymmetry. ×6·5. V.30558.

21. The same, side, showing the basal scar of attachment (*sc*) and longitudinal ridges on the side. ×6·5.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Carpolithus sp. p. 323

22. A small rather obscure wrinkled berry. ×6·5. V.30559.

    'Upper Fish Tooth Bed': Bognor, Sussex.

Woody Gall or Swollen Rootstock p. 323

23. Side showing circular scars representing hair bases or rootlet scars filled with pyrites. ×1·9. V.30560.

24. The same, in longitudinal section, showing the spine or hair-bases or rootlets in the wall at (*h*) and the branching fibres which fill the whole interior of the specimen. ×1·9.

    Herne Bay, Kent.

Rhizophoraceae. Genus? p. 271

25–29. Fragments of tapering fleshy radicles from viviparous embryos, four to six angled. Figs. 27 and 29 are more or less complete at the tip although somewhat rounded by abrasion. ×2. V.30355.

Warden Point, Sheppey.
[NB. These specimens were only identified after the plates were made up.]

Explanation to Plate 32 *continued overleaf*

Fig.

Wood, Stems, Tubers p. 323

30. A stem in transverse section showing medullary rays. ×1·5. V.30561.

31. A tuber or fragment of bored wood showing the end of the central core. ×1·7. V.30562.

32. A pod-shaped compressed nodule of wood or tuber. ×1·3. V.30563.

33. Tuber (?) with depressions like potato "eyes". ×6·5. V.30564.

Fig. 30 Warden Point, Sheppey. Figs. 31, 33 'Upper Fish Tooth Bed': Bognor, Sussex, Fig. 32 Hampton shore, Herne Bay, Kent.

Incertae Sedis p. 324

34–36. Turbinate pyritised bodies, partially subdivided by more or less regular radial furrows. The radii between the furrows are further subdivided by finer shallower furrows. There is much accrescent pyrites which conceals parts of the structure. Their true nature has not been determined. Possibly they are not plants at all. Figs. 34, 35 show side views, Fig. 36 basal view. ×1·7. V.30568–69.

Herne Bay, Kent.

Fig.

Cornaceae? Genus? p. 289

37. Endocarp, side showing fibres in grooves. ×1·8. Ipswich Museum.

38. Same, base? ×1·8.

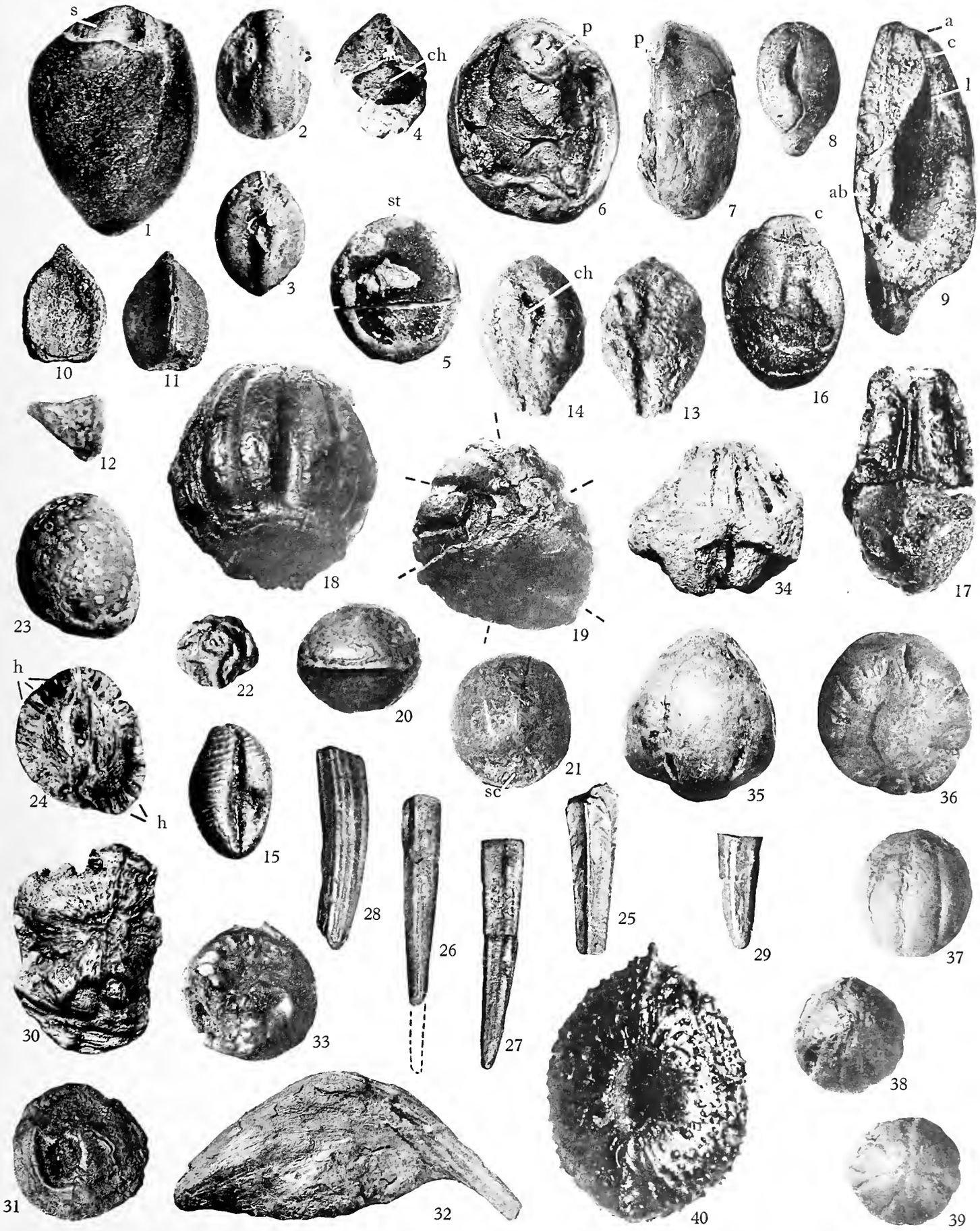
39. Same, apex? (opposite end to preceding showing minute apertures). ×1·8.

Derived from London Clay in Basement Beds of Red Crag, Bawdsey, Suffolk.

Tinospora wilkinsoni n.sp. p. 154

40. Holotype. An endocarp, ventral. ×6·5. V.30587.

East Cliff shore, Herne Bay, Kent.



CARPOLITHUS, RHIZOPHORACEAE GENUS (?), CORNACEAE (?) GENUS (?), TINOSPORA, INCERTAE SEDIS

Explanation of Plate 33

Fig.

Myrica boveyana (Heer) p. 328

1. Endocarp, exterior. ×16. V.34576.

2. Another endocarp, exterior, with an adherent coat showing secreting cavities and fibres. ×16. V.34577.

3. The same specimen showing the locule, the endocarp having split longitudinally; (*f*) funicular canal; (*st*) stylar canal. ×16.

4. Another longer, narrower endocarp, exterior. ×16. V.34611.

Palaeosinomenium pulchrum n.sp. p. 329

5. Holotype. Endocarp, side, showing radial ridges over the horse-shoe shaped locule. They end abruptly on the marginal flange. (*f*) elongate foramen near ventral margin. ×16. V.34585.

6. Another more abraded specimen. (*f*) as above. ×16. V.34586.

7. Part of one valve of a third endocarp, exterior. The apparent width of the foramen (*f*) is due to breaking. ×16. V.34587.

Palaeococculus lakensis n.gen. & sp. p. 330

8. A much compressed and abraded endocarp. The emargination on the right is an accidental break. The smooth marginal area embraces a transversely ridged area over the curved locule (obscured by compression). (*st*) stylar limb. The slightly incurved cotyledonary limb is on the left. The comma-shaped sunken area between the two limbs is slightly lighter in colour owing to matrix which fills it. ×16. V.34583.

9. The same, opposite side. (*st*) as above. ×16.

10. Holotype. For comparison from the type locality, Lower Bagshot, Lake, Dorset. (*st*) stylar limb. ×16. V.34584.

Fig.

Menispermicarpum rariforme n.sp. p. 331

11. Holotype. Endocarp, side, showing transverse ribs on marginal flange and over locule with its horse-shoe ridge. Specimen slightly dorsiventrally distorted. (*f*) foramen; (*st*) stylar limb. The straight ventral margin is clearly shown. ×16. V.34573.

12. The same, opposite side. Transverse ridges over the inner part of the locules are clearly shown, the other ribs are obscured by distortion of the specimen. Foramen (*f*) clearly shown; (*st*) stylar limb. ×16.

?Tinospora excavata Reid & Chandler p. 331

13. Fragment of an endocarp, exterior, showing tubercles. ×16. V.34588.

14. Another fragment, interior, showing the locule and part of the ventral infold (*i*), with radial ridges corresponding with ruminations on the seed. Tubercles are seen in profile on the dorsal margin. ×16. V.34589.

15. Another fragment, exterior. Margin of ventral infold at (*m*). ×16. Specimen now decayed.

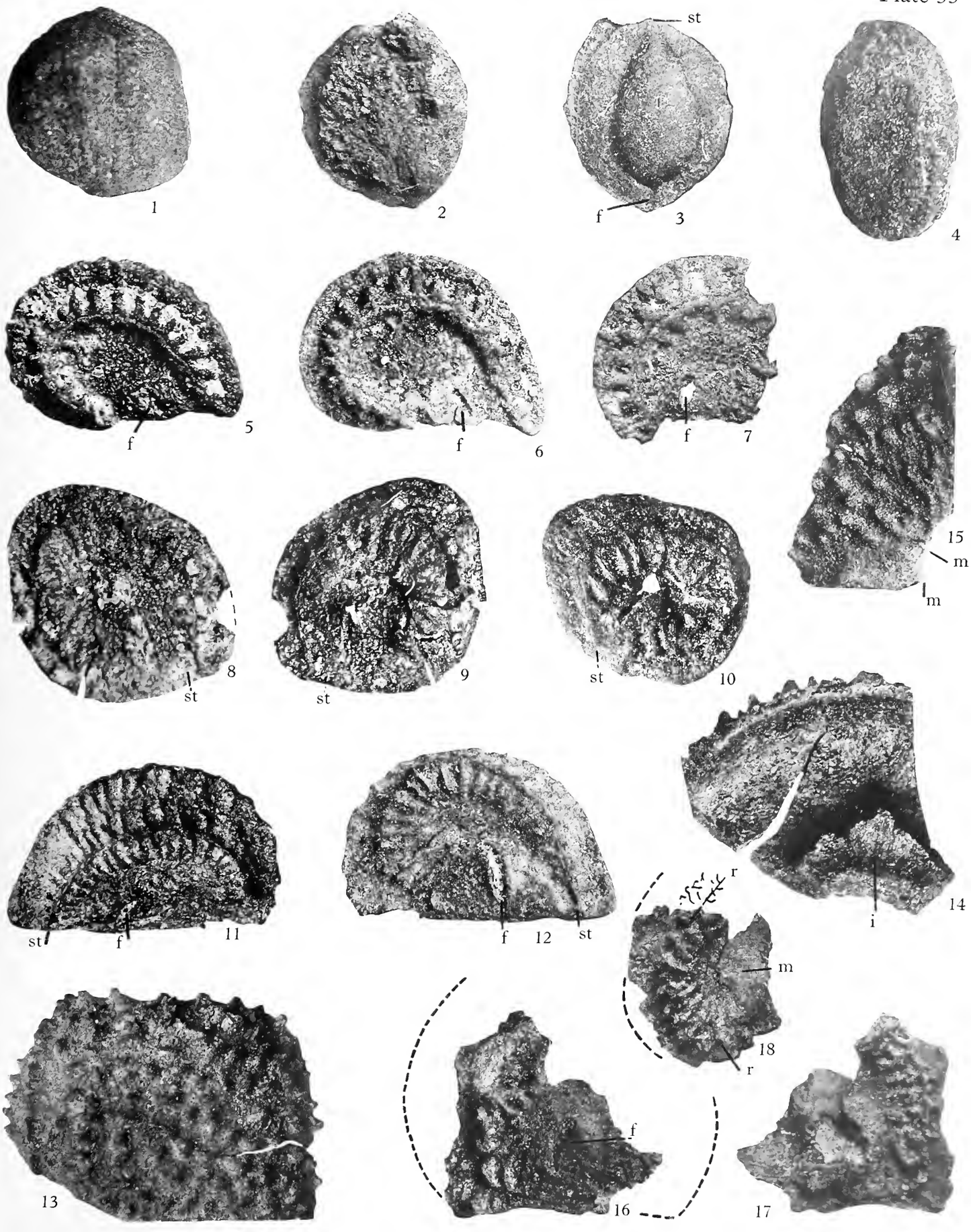
Menispermicarpum sp. p. 332

16. Basal part of a curved endocarp showing the straight ventral margin below, elongate foramen (*f*) and part of a lateral ridge with serrate margin on the left (stylar limb). Only a small part of the right limb of the endocarp is preserved. ×16. V.34574.

17. Opposite side of the same fragment. The foramen is broken. ×16.

18. A fragment representing one stylar limb of a second endocarp. It shows part of the sunk median area (*m*) and the serrate ridge (*r*). ×16. V.34575.

All the above (except Fig. 10) are from Nursling, Southampton.



MYRICA, PALAEOSINOMENIUM, PALAEOCOCCULUS, MENISPERMICARPUM, TINOSPORA

Explanation of Plate 34

Fig.

Bursericarpum clausentium n.sp. p. 333

1. Endocarp, dorsal surface. The lower limits of the large germination valve are obscurely seen near the base of the figure. ×16. V.34567.

2. Another endocarp, margin of valve clearly seen at the base and on the right. ×16. V.34568.

3. Holotype. A larger endocarp, ventral. The curved opening for the funicle is at (*f*). The split above it, along the median ventral angle is accidental and due to contraction on drying. ×16. V.34604.

4. A smaller endocarp, ventral, showing the median angle in the upper four-fifths of the length. Aperture for funicle not seen. ×16. V.34605.

Vitis pygmaea Chandler p. 333

5–7. Three seeds, dorsal surface. ×6·5. V.34591–93.

8–11. Four other seeds, ventral surface. ×6·5. V.34594–97.

Vitis obovoidea Chandler p. 334

12. Seed, dorsal. ×6·5. V.34590.

13. The same seed, ventral. ×6·5.

Tetrastigma sp. (?**T. sheppeyensis**) p. 334

14. Seed, dorsal, slightly imperfect at the hilar end and on the top left hand margin. ×6·5.

15. The same seed, ventral, showing divergent infolds and marked raphe ridge. ×6·5.

Myrtospermum variabile Chandler p. 335

16. A typical seed. ×16. V.34580.

17. A large seed. ×16. V.34581.

18. A small seed. ×16. V.34613.

Myrtospermum n.sp. p. 335

19. A seed. ×16. V.34578.

Myrtospermum sp. p. 336

20. Imperfect seed showing coarse surface pitting. ×16. V.34582.

Ehretia clausentia n.sp. p. 336

21. Holotype. Pyrene, dorsal, showing ornamentation and the deep longitudinal furrow between the two locules. ×16. V.34569.

Fig.

22. Another smaller specimen. ×16. V.34570.

23. Half of a pyrene which has broken down the median furrow. Plane of fracture on the left. ×16. V.34571.

24. Another pyrene. ×16. V.34606.

25. Another, ventral surface, showing incipient splitting of the lateral sutures at the apex. ×16. V.34607.

26. Another, showing the suture lines continued as fractures almost throughout the length of the locules. ×16. V.34608.

27. Another. ×16. V.34609.

28. Another. The split on the left is a natural suture. The one at (*m*) is the beginning of fracture into two one-loculed nuts like that in Fig. 23. Distortion hides the suture on the right. ×16. V.34610.

Family? Genus? p. 337

29. Side view of a septicidal valve of a capsule. The exocarp is on the right and the fibrous obliquely striate septum occupies most of the figure. The septa separate so that the locule is open on the left. ×16. V.34600.

30. Another valve from a larger fruit, looking onto the locule-cavity which is exposed by the gaping and breakage of the ventral edges of the septal walls. Exocarp is seen around the sides of the figure projecting from behind. ×16. V.34601.

31. Another specimen, side, showing the septicidal surface. The ventral gape is on the right, the broken exocarp (dorsal wall) is on the left. ×16. V.34602.

Anemia poolensis Chandler p. 327

32. Side view of apical annulus, torn sporangium wall below. ×150. V.34618.

33. Spore showing smooth form. ×150. V.34620.

34. Another somewhat collapsed but larger spore showing obscurely the triradiate mark facing the camera. ×150. V.34623.

35. A paraphysis. ×150. V.34620.

All the above from Nursling, Southampton.

BURSERICARPUM, VITIS, TETRASTIGMA, MYRTOSPERMUM, EHRETIA, ANEMIA