TYPE AMMONITES—V

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

PART XLII
20 Plates

PUBLISHED BY THE AUTHOR

SOLD BY

WHELDON & WESLEY, LTD.
2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET
LONDON, W.C. 2

October, 1923

CONTENTS

PART XLII

Illustrations :—

CHELTENHAM
NORMAN, SAWYER AND CO. LTD., PRINTERS
ST. GEORGE'S HALL

Fig. 2

Fig. 1

AEGOCERAS HADROPTYCHUM
" Radstock Grove, Radstock, Somerset ; Corngrits, *johnstoni* "
J.W.T. Coll. ; S. 48, 31·5, 31·5, 42 ; 82, 28, 36·5, 50 ; max. c. 110

FRANZICERAS RUIDUM, NOV.
Caloceratan, *johnstoni* ; Genotype, Holotype. Cf. XVIII

× 3

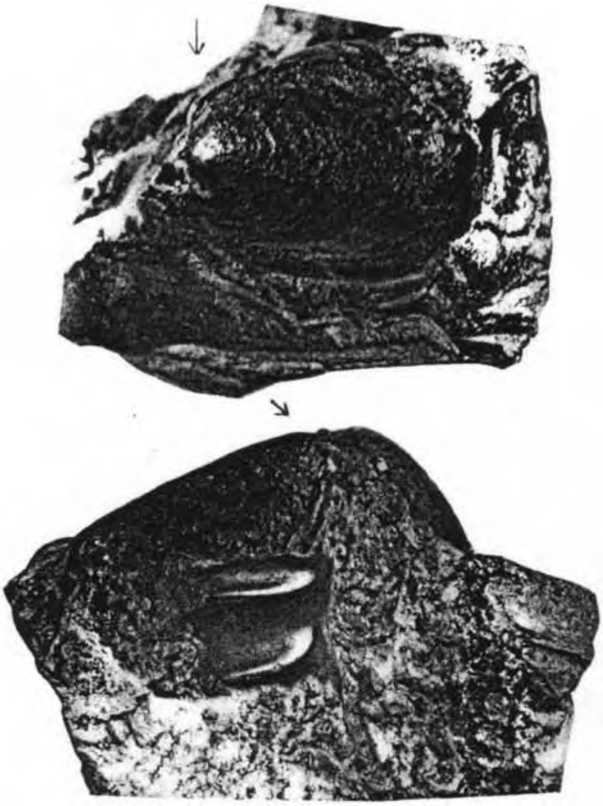


Fig. 1

Fig. 2

ANAPTYCHUS
Lyme Regis, Dorset; Lower Lias, [Bed 74f], (Cf. W. D. Lang, Q.J.G.S., LXXIX, 1923, 59), bluish limestone with calcite
S.B. Coll. 3943, purch. Anaptychus black, apex dorsal; 13 × 10 mm.

ANAPTYCHUS (ARNIOCERAS HARTMANNI, OPPEL SP. ?)
Coroniceratan, *hartmanni*. See CXII, CCCXC

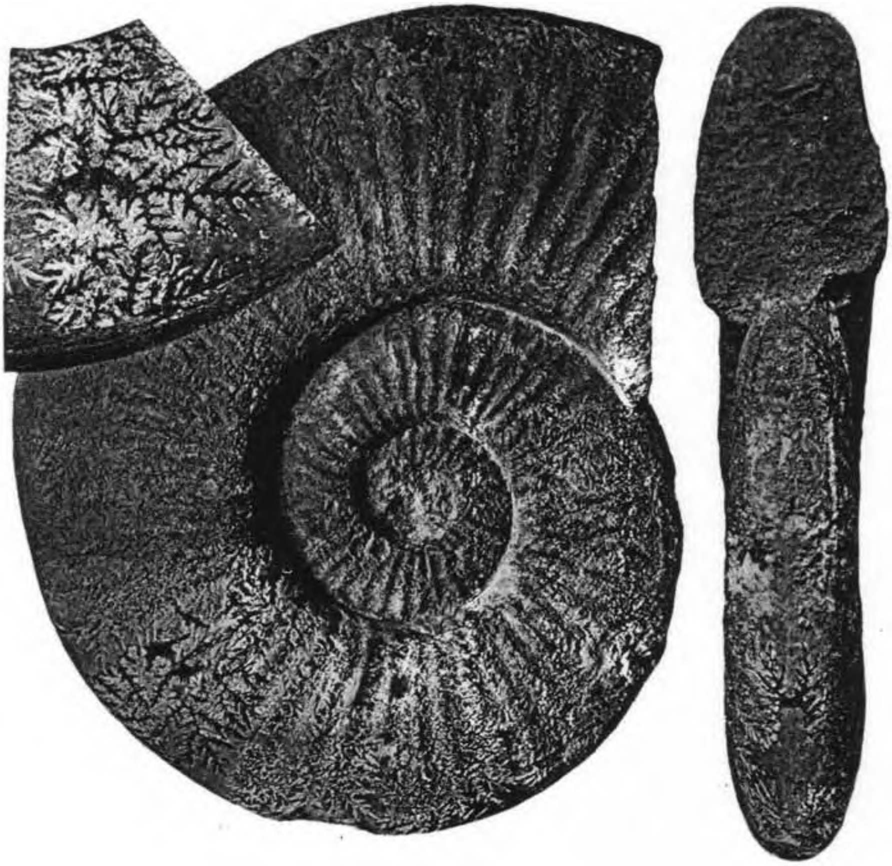
Fig. 2 Fig. 1

Fig. 3

ECHIOCERAS RARICOSTATUM
" Radstock Grove, Radstock, Somerset ; base of *armatus* " (derived)
Grey, phosphatic in conch, yellow limestone outside ; J.W.T. Coll.
. S. 77, 19·5, 22(18), 62 ; 107, 21·5, 26, 62·5 ; size c. 114 ; max. c. 120

ECHIOCERAS RARICOSTATOIDES, VADASZ
Deroceratan, *raricostatoides*. See XCVI

Fig. 3, N.S. Fig. 1 × 0·69 Fig. 2



MICRODEROCERAS cf. LORIOLI ; S. BUCKMAN, 1918, cit. spec.
Q.J.G.S., LXXIII, 307 ; "Radstock Grove, Radstock, Somerset
"Base of *armatus*" (*leckenbyi*, S.B.) ; J.W.T. Coll
S. 83, 38, 24·5, 31 ; 164, 35·5, 22, 38 ; max. c. 250+

EPIDEROCERAS DEFLUXUM, nov.
Deroceratan, *defluxum* ; Holotype. Cf. XXXIX

× 0·69

SONNINIA GRACILILOBATA
(Cf. S.B., Q.J.G.S., XLIX, 1893, 494), [Sandford Lane], " Sherborne
" Dorset "; [Fossil Bed, (lower) middle part] ; S.B., ex Darell. Coll. 1015
S. 122, 46·5, 30, 19·5 ; 224, 43, 31·5, 27 ; max. c. 230

SHERBORNITES UNDIFER, NOV.
Sonninian, *Shirbuirnia* ; Holotype. See CDXI

× 0·73

SONNINIA PATELLA
" Clatcomb, [Sandford Lane], Sherborne, Dorset ; Inferior Oolite "
[Fossil Bed, upper part] ; S.B., ex Darell, Coll. 1283
S. 126, 47, 21·5, 19 ; 192, 47, 20, 21 ; size c. 244, max. c. 310

SONNINITES FELIX, nov.
Sonninian, *sauzei* ; Genotype, Holotype. Cf. CDXII

× 1·4

Fig. 2

Fig. 1

Fig. 1a

SONNINIA aff. PATELLA; S. BUCKMAN, 1893, cit. spec.
Q.J.G.S. XLIX, 494; Sandford Lane, Sherborne, Dorset
Fossil Bed, upper part: S.B. Coll. 3919; brephomorph
S. 18·5, 39, 35, 28·5-; 36, 45, 28, 26·5; max. c. 50

SONNINITES FELIX, NOV.
Sonninian, *sauzei*: Paratype. Cf. CDXII

Fig. 1
× 0·66

Fig. 2
× 0·66

Fig. 3b

Fig. 3a

" AMMONITES EUDESIANUS " ; J. BUCKMAN, 1875. cit. spec. ?
Somerset Arch. Proc., XX, 146 ; " near Sherborne, Dorset ; I.O."
White matrix inside, ironshot in body-ch. ; S.B., ex Darell, Coll. 1008
S. 100, 35, 34, 37 ; 200, 35, 32, 40 ; max. c. 265

METROLYTOCERAS METRETUM, NOV.
Sonninian, *sauzei* ; Genotype, Holotype. Cf. LXX

Fig. 1

Fig. 3b

Fig. 2

Fig. 3a

AMMONITES GERVILLII
" Dundry, Somerset ; brown ironshot, *sauzei* " ; J.W.T. Coll.
S. 27, 44, 88, 11 ? ; 43 42 65 (84 over mouth), 25·5 ; max. 45

FROGDENITES PROFECTUS, nov.
Sonninian, *sauzei* ; Holotype. See CCXV

Fig. 1

Fig. 2

AMMONITES GERVILLII; J. BUCKMAN, 1881, cit. spec.
Q.J.G.S., XXXVII, 63; *Sphæroceras gervillii*, S.B., Id., 597
Milborne Wick, Som.; white oolitic marl; S.B., ex J.B., Coll. 3913
S. 28, 50, 86, 16; 42, 43, 64, 19; max. 47 over ridge

CHONDROCERAS DELPHINUS, nov.
Stepheoceratan, *Epalxites*; Holotype. See CDXV

AMMONITES HUMPHRIESIANUS
Lower Clatcombe, Sherborne, Dorset ; *Niortensis* hemera
(Q.J.G.S., XLIX, 497, § XIII, 7) ; S.B. Coll. 3925
The costæ are septate till well on in body-chamber

CADOMITES SEPTICOSTATUS, NOV.
Stepheoceratan, *Leptosphinctes* ; Holotype. Cf. CCCL

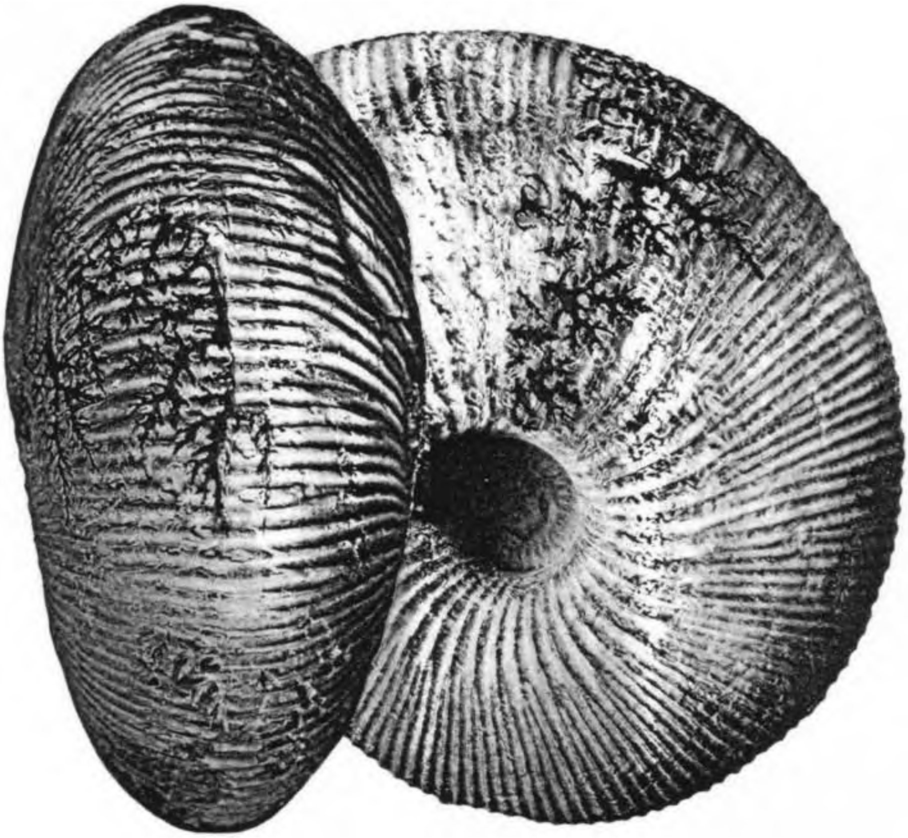
Fig. 2

Fig. 1

AMMONITES HUMPHRIESIANUS
Lower Clatcombe, Sherborne, Dorset ; *Niortensis* hemera
S. 73, 37, 46, 37 ; 119, 31·5, 33, 44 ; max. 122
Septate costæ are rare among Stepheoceratids

CADOMITES SEPTICOSTATUS, NOV.
Stepheoceratan, *Leptosphinctes* ; Holotype. Cf. CCCL

Fig. 2 Fig. 1



AMMONITES MACROCEPHALUS
[Cocklebury Hill, Chippenham, Wilts; Kell. Clay], light blue
J.W.T. Coll.; S. 62, 48, 56, 18·5; 100, 52, 54, 17; size 116
Max. 170+. Costæ septate, upper edge mainly lost

TMETOKEPHALITES SEPTIFER, nov.
Macrocephalitan, *Macrocephalites*; Holotype. See CCCLXXIII

Fig. 2b

Fig. 1

Fig. 2

Fig. 1a

Fig. 2a

Fig. 3

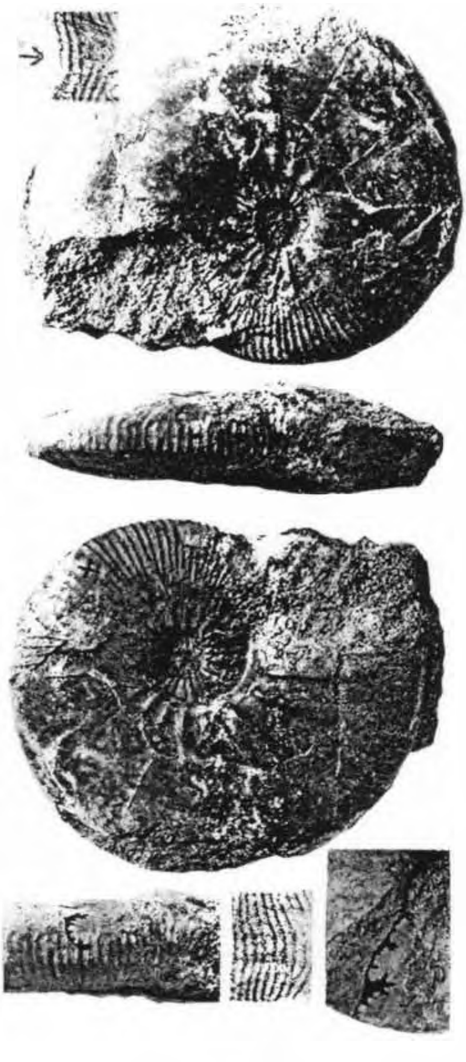


Fig. 2c

"Sigaloceras sp."
"South Cave, Yorkshire; Kellaways Sands"
Siliceous, ironshot; specimen ironstained; Dr. A. Morley Davies Coll.
S. 31, 49, 32, 18; 56, 43, 27, 23; max. c. 58

CATASIGALOCERAS CRISPATUM, nov.
Macrocephalitan, *Catacephalites*; Holotype. See CDXVII

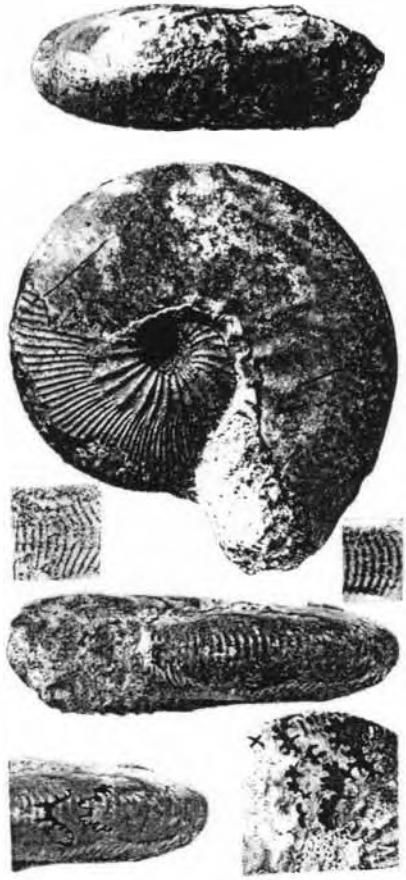


Fig. 3

Fig. 1

Fig. 2c

Fig. 2b

Fig. 2

Fig. 2a

Fig. 4

"SIGALOCERAS SP."
"South Cave, Yorkshire; Kellaways Sands," siliceous, ironshot
Dr. A. Morley Davies Coll.: S. 32·5, 48, 34, 18; 55, 39, 31, 25·5
Declining runcinate venter passes to round stage

CATASIGALOCERAS CURVICERCLUS, NOV.
Macrocephalitan, *Catacephalites*; Holotype. See CDXXXIV

× 3 × 1.1

Fig. 1a

Fig. 1

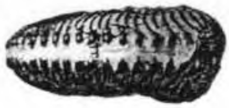


Fig. 2

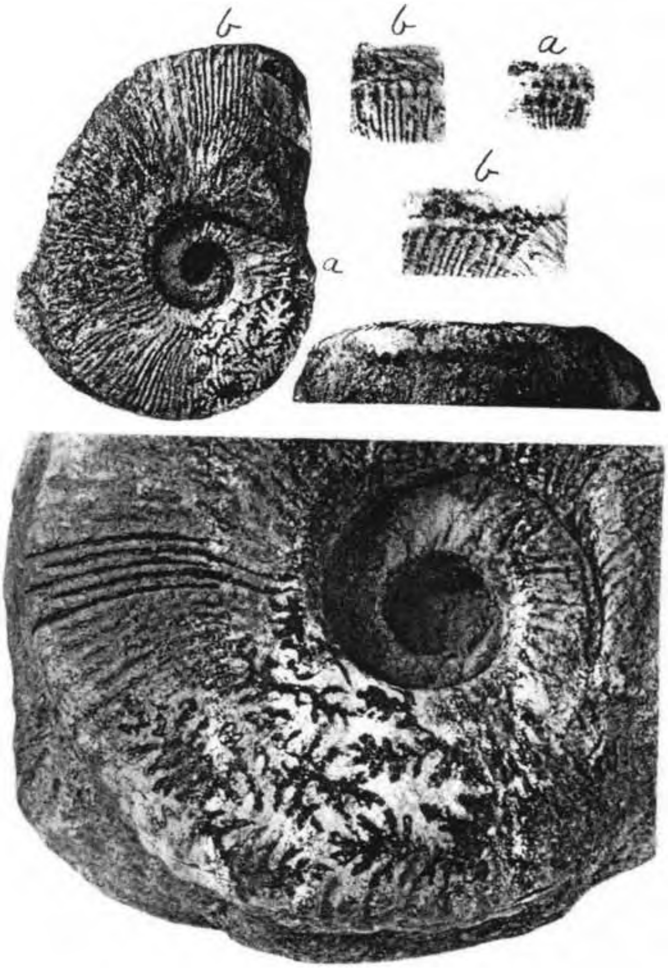
COSMOCERAS PRONIÆ
Summertown Brickyard, Oxford ; Oxf. Clay, above *athleta ?*)
S.B. Coll. 3944 ; S. 19, 39·5, 34, 29 ; 39, 46, 29·5, 25·5 ; max. c. 60+
(Teisseyre, Rjäsan ; Sitzb. Ak. Wiss., LXXXVIII, 1883, III, 15, lectotype)

LOBOKOSMOKERAS PRONIÆ, TEISSEYRE SP. (see above)
Kosmoceratan, *proniæ* ; Genotype. Cf. CDXIX

Fig. 2b*

Fig. 1 Fig. 2a Fig. 2b Fig. 2

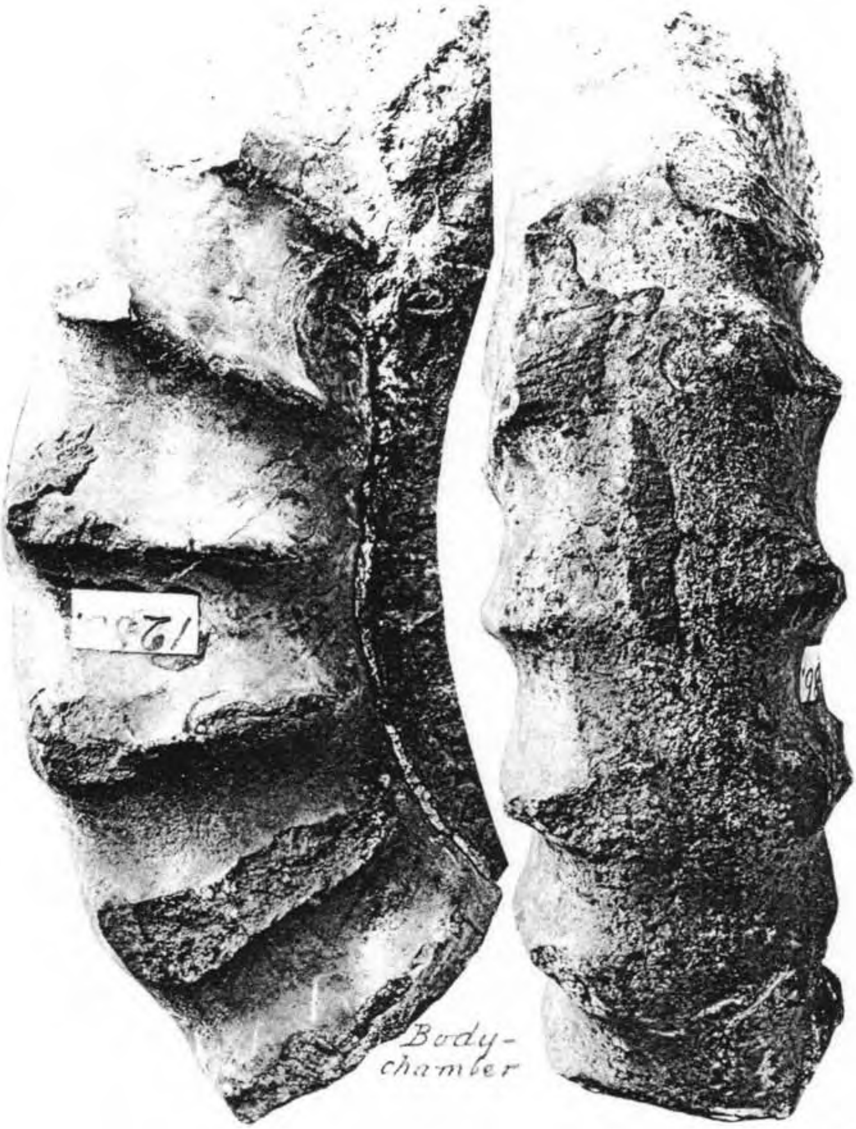
Fig. 1a
× 3



AMMONITES ROWLSTONENSIS, YOUNG & BIRD, 1822, Holotype
Geol. Yorks, 252, 253, 327; XIII, 10; "Rowlston scar"
"Calcareous sandstone"; Whitby Museum 1512
S. 22·5, 44, 31, 28; 48, 43, 27, 26; max. c. 70–

LOBOKOSMOKERAS ROWLSTONENSE, YOUNG & BIRD SP.
Kosmoceratan, *proniæ*. See CDXXXVI

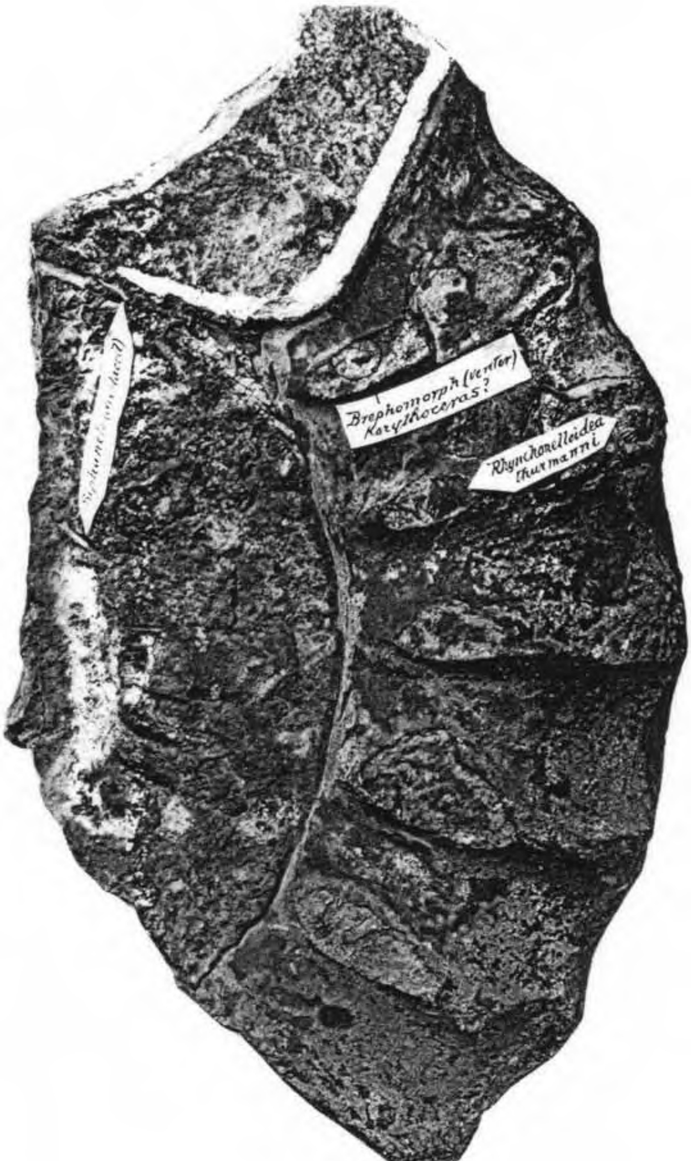
Fig. 1 × 0·55 Fig. 2



AMMONITES ACUTICOSTATUS, YOUNG & BIRD, 1822, Holotype
Geol. Yorks, 248 ; [Malton district], " Yorkshire ; grey limestone "
Hard, greyish limest., small *Ostrea* and *Rhynchonelloidea* " *thurmanni* "
Whitby Mus. 1286 ; S. (370, 24, 23(21), 58) ; max. c. 375

ASPIDOCERAS ACUTICOSTATUM, YOUNG & BIRD SP.
Cardioceratan, *acuticostatum*. See CCCLXIV

× 0·55



AMMONITES ACUTICOSTATUS, YOUNG & BIRD, 1822, Holotype
Cf. Appleton, C beds, Blake & Hudl., Q.J.G.S., XXXIII, 1877, 363
" Top bed [of C] pretty full of *R. Thurmanni*." (Cf. T.A., IV, 41)
Mouth with long dorsal lap; signs of low arch on broken venter

ASPIDOCERAS ACUTICOSTATUM, YOUNG & BIRD SP.
Cardioceratan, *acuticostatum*. See CCCLXIV

Fig. 1
× 0·8

Fig. 1a
× 0·8

Fig. 2
× 0·9

AMMONITES BOLONIENSIS
Barrel Hill, Long Crendon, Bucks; Creamy Limestones [Soft Rock]
Matrix whitish, slightly ironspecked; S.B. Coll. 3692, purch.
S. 104, 28, 35·5, —; 155, 28, 30, 53; max. c. 180

GALBANITES MIKROLOBUS, nov.
Gigantitan, *Trophonites*; Holotype. See CCCLV

TYPE AMMONITES—V

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

PART XLIII
20 Plates

PUBLISHED BY THE AUTHOR

SOLD BY

WHELDON & WESLEY, LTD.

2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET

LONDON, W.C. 2

December, 1923

CONTENTS

PART XLIII

CHELTENHAM
NORMAN, SAWYER AND CO. LTD., PRINTERS
ST. GEORGE'S HALL

Fig. 1 ×0·89 Fig. 2

LYTOCERAS CORNUCOPIÆ; S. BUCKMAN, 1896, cit: spec.
Geol. Mag., (4) III, 421; South Petherton, Somerset
Upper Lias, clay beds; S.B. Coll. 1032
S. 60, 41·5, 36, 34; 168, 44, 32, 30; max. c. 270 +

LOBOLYTOCERAS SIEMENSI, DENCKMANN SP. 1887
Harpoceratan, c. *falciferum*; Genotype. Cf. CCCXCI

Fig. 2

Fig. 1

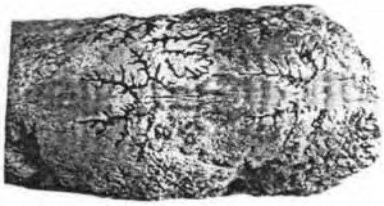


Fig. 3

MICRODEROCERAS LORIOLI, S. Buckman, 1918, cit. spec.
Q.J.G.S., LXXIII, 307 ; " Radstock Grove, Radstock, Somerset "
" Base of *armatus*, (*raricostatus* debris) " ; J.W.T. Coll.
" S. 46, 37, 32·5, 32·5 ; 97, 37, 31, 36 " ; max. c. 200 ?

EPIDEROCERAS EXHÆREDATUM, NOV.
Deroceratan, *defluxum* ; Holotype. See CDXXVI

Fig. 1a, × 3

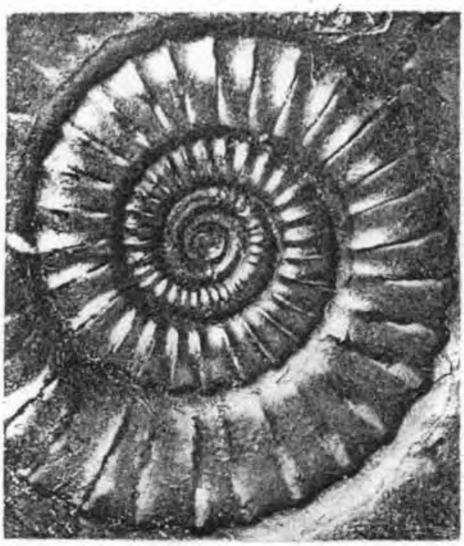


Fig. 1

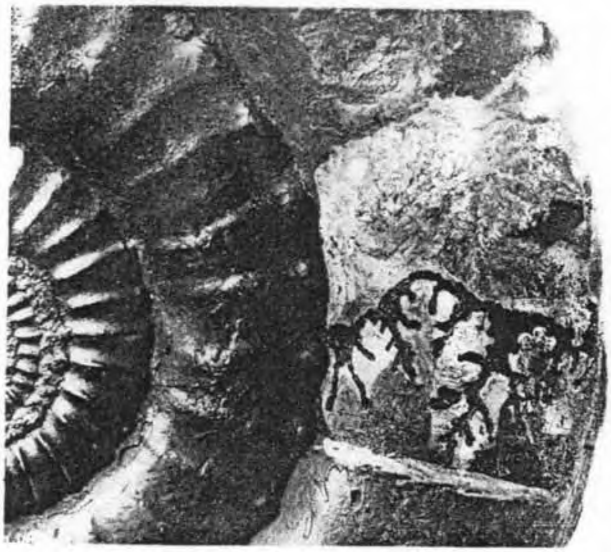


Fig. 1b × 3 Fig. 2 Fig. 2a

AMMONITES DENSINODUS; OPPEL, 1856, Plesiotype
Juraformation, pp. 89, 90; "Lyme Regis, Dorsetshire"
"Zone des *Amm. raricostatus*"; Munich Museum (Oppel Coll.)
S. 33, 26, 19·5, 51·5; 53, 23·5, 17, 58; max. c. 90

CRUCILOBICERAS DENSINODULUS, NOV.
Deroceratan, *densinodulum*, Holotype. See CLXXVIII

Fig. 1

Fig. 2

AMMONITES MACDONNELLII, PORTLOCK, Topotype?
(Geol. Londonderry, 1843, 133, 134; XXIX A, fig. 12); "Cheltenham"
[Larne, Antrim, Ireland]; pyritic; J.W.T. Coll.
"S. 33, 24, 15?, 58; 55, 22, 13, 58"; max. c. 85

LEPTECHIOCERAS MACDONNELLII, PORTLOCK SP.
Deroceratan, *macdonnellii*; Genotype. Cf. CDXXV

Fig. 1 0·84

Fig. 2b N.S.

Fig. 2a N.S.

HARPOCERAS DOUVILLEI
Down Cliff, Chideock, Dorset ; Upper Lias, *bifrons*
Junction Bed, pink layer ; S.B. Coll. 3774
S. 94, 29, 26, 46 ; 151, 26·5, 21, 52

ORTHILDAITES ORTHUS, nov.
Hildoceratan, *Hildoceratoides* ; Genotype, Holotype. Cf. CCXVIII

Fig. 3

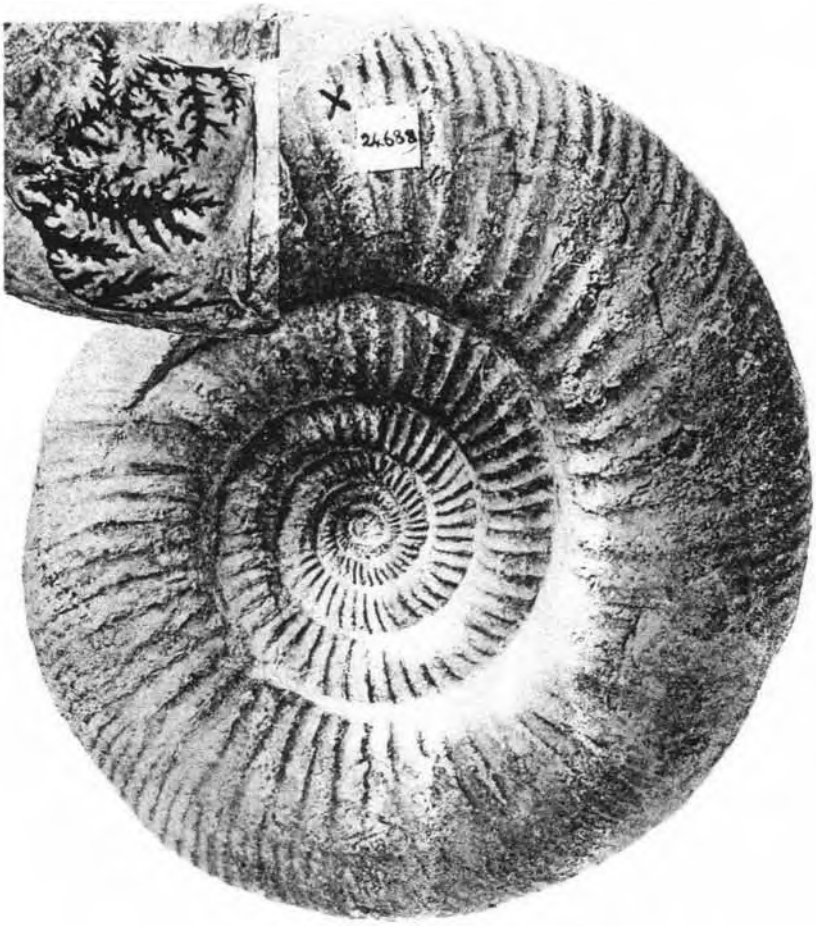
Fig. 2a, b

Fig. 1

Sonninia schlumbergeri
(*Nannoceras* sp. n., S.B., MS.); Bradford Abbas, Dorset; I.O. Fos. B. *discites*; S.B. Coll. 3966; inner whorls tuberculate (coronate stage)
S. 18·5, 35, 38, 38; 32·5, 37, 31, 38·5; max. 33

NANNOCERAS NANNOMORPHUM, nov.
Sonninian, *rudidiscites*; Genotype, Holotype. Cf. CCCXCIX

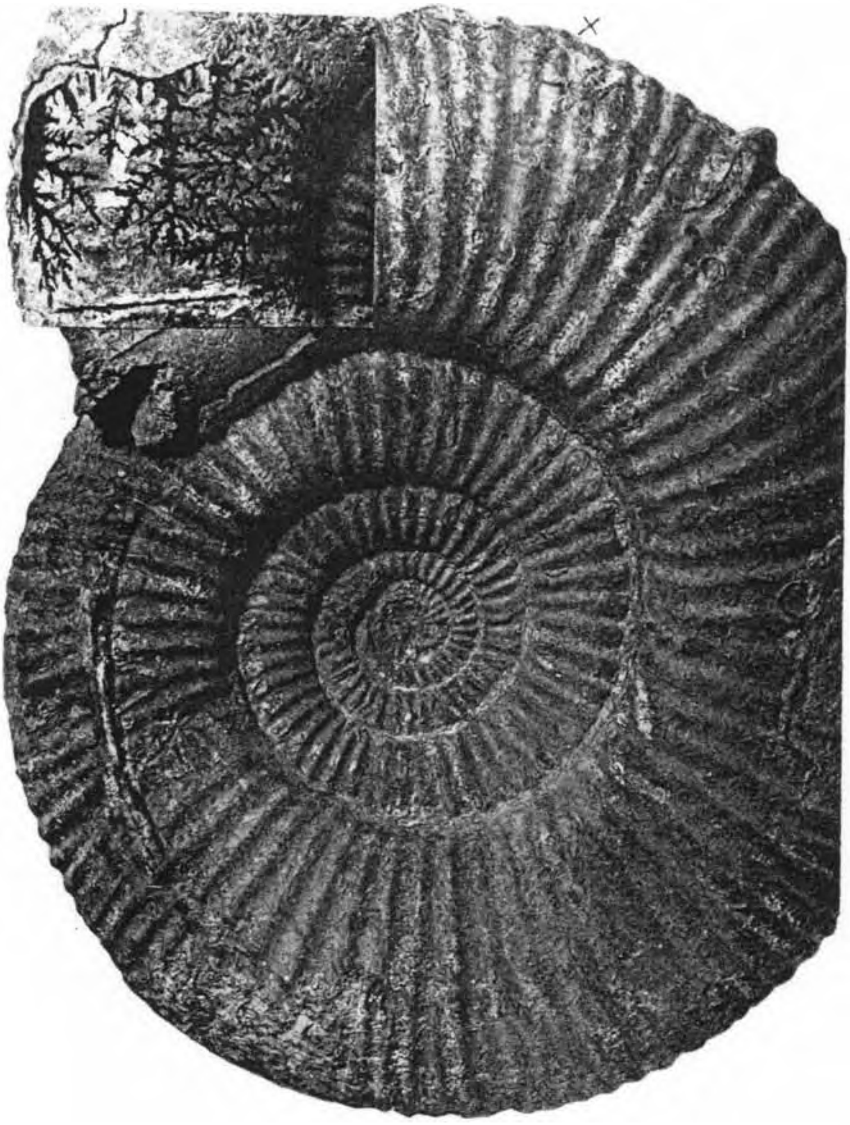
Fig. 2 N.S. Fig. 1 × 0·77



" PERISPHINCTES PSEUDOMARTINSI "
" Vetney Cross, Bridport, Dorset ; [Shell Bed], *garantiana* "
Geol. Surv. Engl. 24688, (S.B. Coll.) ; S. 100, 32, 31, 45
S. 155, 30·5, 29, 45 ; max. c. 270. Prorsiarcuate costæ on venter

PRORSISPHINCTES MESERES, NOV.
Parkinsonian, *garantiana* ; Holotype. See CCCXXVI

Fig. 2 Fig. 1 × 0·94



AMMONITES MOOREI
" Burton Bradstock, Dorset ; Inf. Ool." [3rd Bed, *truellei*]
S.B., ex Darell, Coll. 1251 ; S. 91, 31, 33, 39.5
S. 142, 32·5, 31, 41 ; ribs 54 ; size c. 156 ; max. c. 280

LOBOSPHINCTES INTERSERTUS, nov.
Parkinsonian, *truellei* ; Genotype, Holotype. Cf. CDXVI

Fig. 4

Fig. 2

Fig. 3

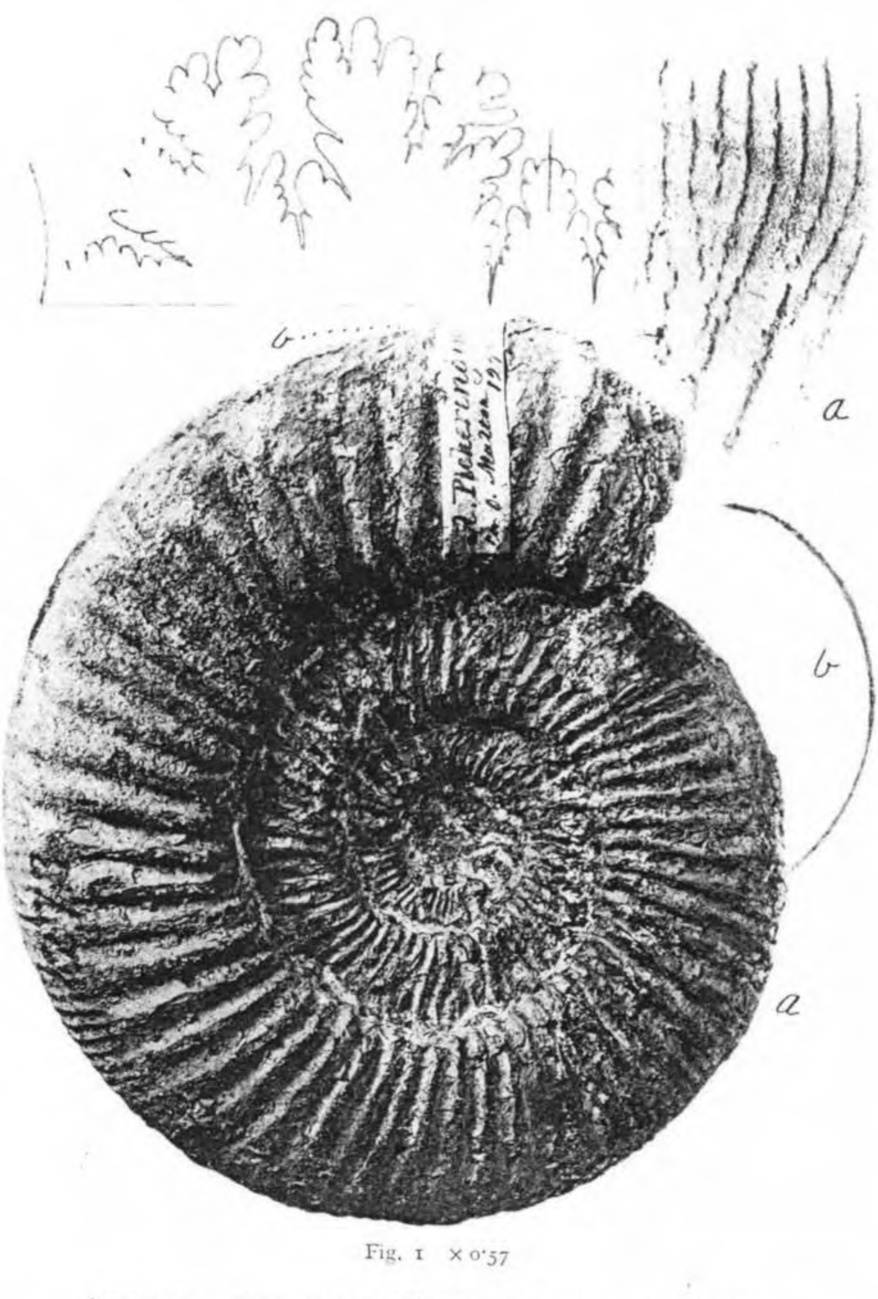


Fig. 1 × 0·57

AMMONITES PICKERINGIUS, YOUNG & BIRD, 1822, Holotype
Geol. Yorks, 251 ; XII, 9 ; [Pickering], Oolite, p. 251
("Cor. O. Malton," Simpson ?), matrix white and buff, subpisolitic
(Cf. Blake & Hudleston, 1877, 335, f. 13 g) ; Whitby Mus. 1273
S. 126, 33, 30, 43 ; 208, 28, 26, 48 ; ribs 54, c. 148 ; max. c. 360

TOXOSPHINCTES PICKERINGIUS, YOUNG & BIRD SP.
Perisphinctean, *pickeringius* ; Genotype. Cf. CLXXXIV

Fig. 1

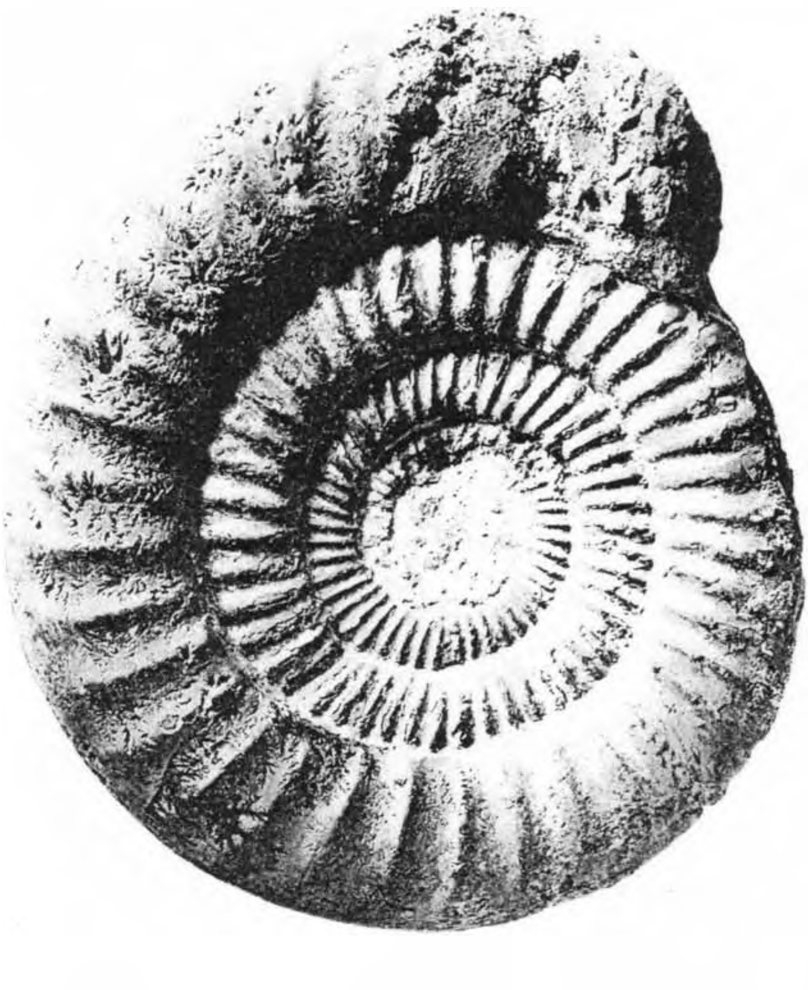
Fig. 3

Fig. 2

AMMONITES TRIPLEX
Cowley, (Hollow Way, excav. for new houses), Oxford ; Corallian
[L.C.G.] ; S.B. Coll. 3582 ; S. 7·5, 40, 80, 27 ; 14, 32, 60, 39
S. 24·5, 28·5, 51·5, 52 ; 40·5, 27, 40, 56 ; 68, 28, 34·5, 58

KRANAOSPHINCTES DECURRENS, nov.
Cardioceratan, *Goliathiceras* ; Holotype. See CCXLIII

× 0.51



AMMONITES TRIPLEX
(Cf. *Perisphinctes gyrus*, Neumann, 1907, 37; III, 11
Cowley (near Industrial School,), pit near Horsepath road
"Shell Bed," calcareous with *Exogyra* (small) and *Chlamys*
S. 160, 24, 27, 56; ribs 46; 227, 23, 25·5, 57; ribs 39; max. c. 390

CYMATOSPHINCTES CYMATOPHORUS, NOV.
Perisphinctean, *martelli*; Genotype, Holotype. Cf. CDXLVIX

Fig. 1

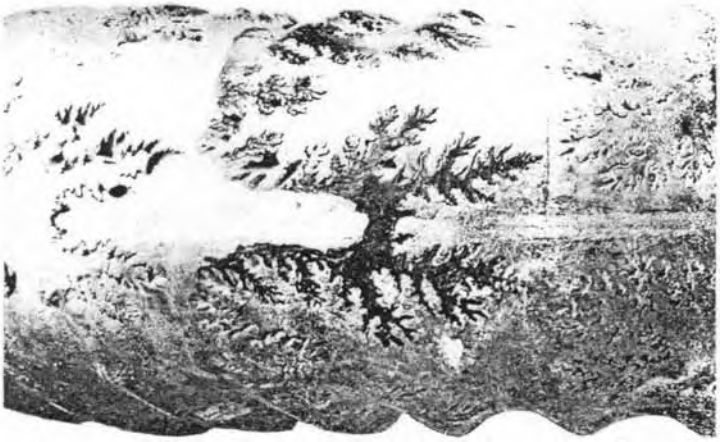


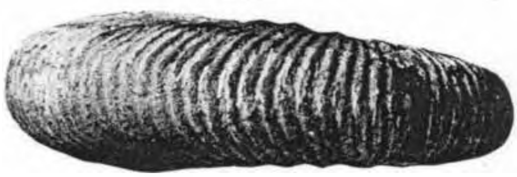
Fig. 2

AMMONITES TRIPLEX
(Cf. *Perisphinctes promiscuus*, Bukowski, 1887, XXIX, 2)
Cowley, Oxford; Oxf. Ool. "Shell Bed"; S.B. Coll. 3301
EL, 89, L1, 73, Aux. 2, 44 per cent. at 51 mm.

CYMATOSPHINCTES CYMATOPHORUS, NOV.
Perisphinctean, *martelli*; Genotype, Holotype. Cf. CDXLVIX

Fig. 1

Fig. 2



AMMONITES VIRGATUS
Long Crendon (Barrel Hill), Bucks; Portl., Creamy Limestones [Lower Witchett], white, chalky; S.B. Coll. 2956
S. 45, 47, 27, —; 72, 47, 30·5, 22; max. c. 80; Cf. CDII B

GALBANITES FASCIGER, NOV.
Gigantitan, *fasciger*; Holotype. See CDXXXIX

× 0·15

AMMONITES PSEUDOGIGAS
Long Crendon, (Barrel Hill), Bucks; Portland Stone
Creamy Limestones [Blue Bed]; S.B. Coll. 2965
S. 165, 32, 41, 44; 278, 30·5, 37, 45; ribs 28; max. c. 285

GIGANTITES ZETA, nov.
Gigantitan, *Gigantites*; Holotype. See CCLVI

× 0.62

Ammonites pseudogigas
Long Crendon, (Barrel Hill), Bucks; S.B. Coll. 2965
Ribs cross venter to alternate knobs, Z style

GIGANTITES ZETA, nov.
Gigantitan, *Gigantites*; Holotype. See CCLVI

Fig. 1

Fig. 2

Fig. 1a

AMMONITES MICROMPHALUS, PHILLIPS, 1871. Topotype
(G. Oxf., 181 ; x, 38) ; (Cf. *Am. busqueti*, Grossouv., 1918, 412 ; XIV, 2)
"*Am. gracilis*, Stonesfield [Oxfordshire] ; Stonesfield Slate"
"Pres. Earl of Enniskillen ;" Geol. Surv. Engl. 25607
S. 50, 46, 23 +, 15·5 ; 66, 47 ?, 21 +, 11·5, (crushed) ; max. c. 70

MICROMPHALITES MICROMPHALUS, PHILLIPS SP.
Gracilisphinctean, *micromphalus* ; Genotype. Cf. CLXXVII

Fig. 1

Fig. 2

Fig. 4

Fig. 1a

AMMONITES CAWTONENSIS, BLAKE & HUDLESTON, 1877, Holotype
Q.J.G.S., XXXIII, 370, 392, 403 ; XIII, 2 ; " Sike Gate, Cawton, Yorks "
" Coral Rag," 370, fig. 20, bed 8 ; Geol. S. Engl. (Hudl. C.) 46265
S. 35, 40, 34·5, 31·5 ; 57, 40, 29, 33 ; size 61 ; max. c. 70

CAWTONICERAS CAWTONENSE, BLAKE & HUDLESTON SP.
Perisphinctean, *cawtonense* ; Genotype. Cf. CXCVIII

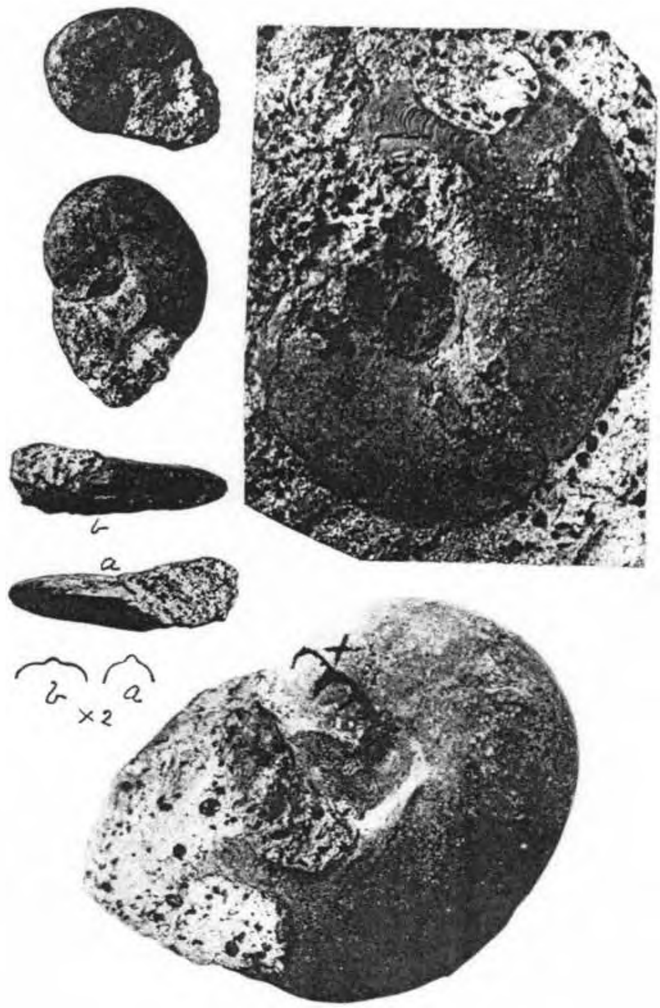


Fig. 1

Fig. 1a × 1·36

Fig. 2b × 1·36

Fig. 2a

Fig. 2* a, b

Fig. 3 × 3

Fig. 1b × 3

'CADOMOCERAS' SP., S. BUCKMAN, 1896, cit. spec.
Q.J.G.S., LII, 698; (Cf. *Cadom. sullyense*, Brasil, 1895, 17; IV, 8, 9)
Dundry, Somerset; Ironshot Bed; S.B. Coll. 3970, 3971
S. 10·5, 51, 31, 11; 18·5, 46, 25·5, 21; Figs. 1, 2 H.T.; (Fig. 3, 3971, P.T.)

CADOMOCERAS ELLIPTICUM, NOV.
Sonninian, *sauzei*; Holotype (Figs. 1, 2). See CLXXXIX

Fig. 1

Fig. 2a, b, × 2

Fig. 1a × 3

'CADOMOCERAS' SP., S. BUCKMAN, 1896, cit. spec.
Q.J.G.S., LII, 698; Dundry, Somerset; Bajocian
Ironshot Bed, *sauzei*; S.B. Coll. 329
S. 11, 48, 37, 15·5; 24, 46·5, 29, 18·5

CADOMOCERAS CARINATUM, NOV.
Sonninian, *sauzei*; Holotype. See CDLV

× 1·36

Fig. 1a

Fig. 1

Fig. 2

Fig. 3

SCAPHITOID AMMONITE
" Sandford Lane, Sherborne, Dorset ; I.O., Fossil Bed, middle
" *Brocchii* Bed " ; S.B. Coll. 3920
S. 12, 50, 37·5, 19 : 25, 41, 28·5, 27 : max. 25

CADOMOCERAS COSTELLATUM, NOV.
Sonninian, *Labyrinthoceras* Holotype. See CDLVI

TYPE AMMONITES—V

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

PART XLIV
20 Plates and one Reprint

PUBLISHED BY THE AUTHOR

SOLD BY
WHELDON & WESLEY, LTD.
2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET
LONDON, W.C. 2

February, 1924

CONTENTS

Part XLIV

CHELTENHAM
NORMAN, SAWYER AND CO. LTD., PRINTERS
ST. GEORGE'S HALL

Fig. 1a × 3·1

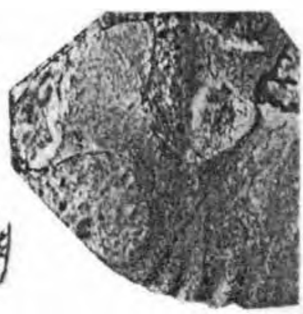


Fig. 1 × 1·4 Fig. 2 Fig. 1b × 3·1

AMMONITES CADOMENSIS; S. BUCKMAN, 1881, cit. spec.
Q.J.G.S., XXXVII, 607; "Combe [Frogden Q. § xv, 3], Sherborne,
"Dorset"; S.B., ex T. C. Maggs, Coll. 609; S. (8·75), 51, 34, 20
S. 14·5, 49, 27·5, 22·5; 16, 44, 25·5, 22; 21, 43, 26, 26·5

CADOMOCERAS SIMULACRUM, nov.
Stepheoceratan, *niortense*; Holotype. See CDLVII

Fig. 1 Fig. 2

Fig 1a × 3·1

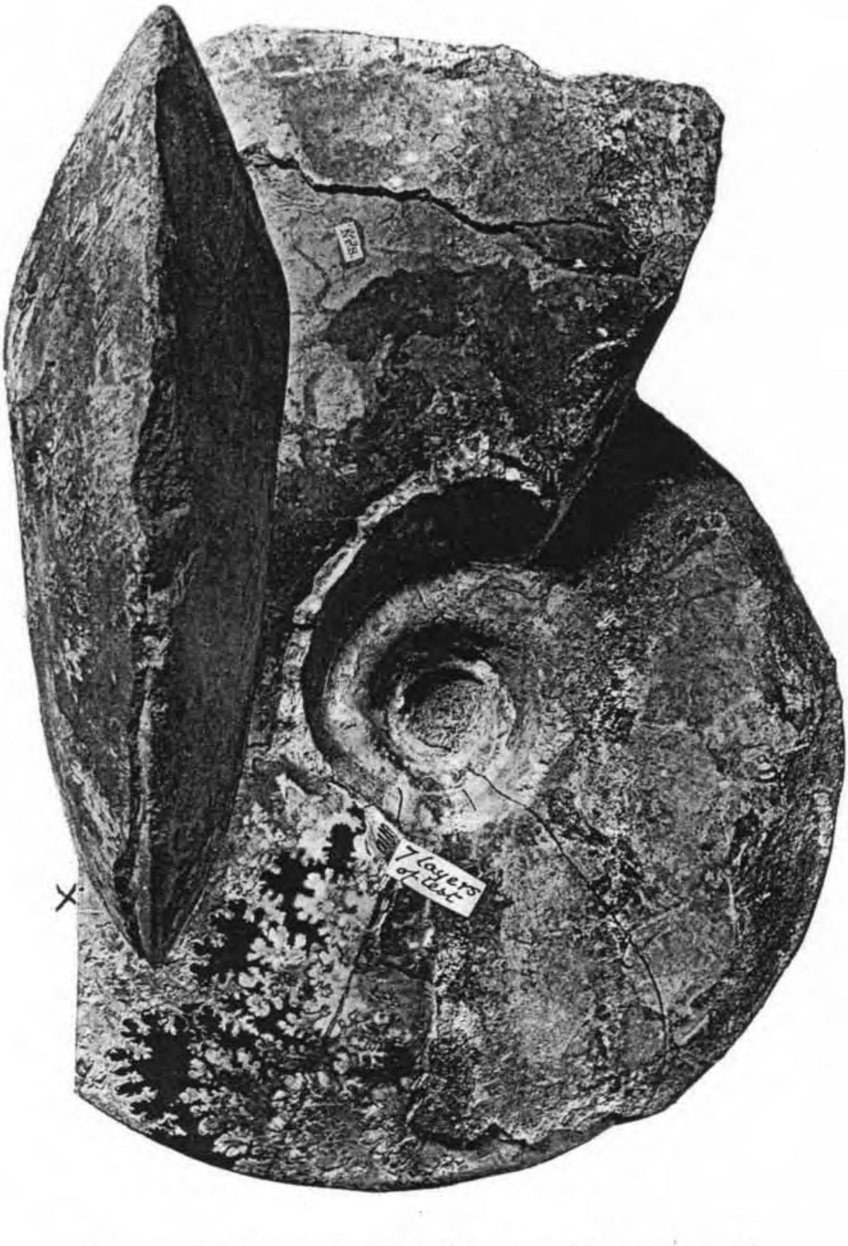
Fig. 1b × 3·1

AMMONITES SCAPHITOIDES, COQUAND
Cf. *Oekotraustes scaphitoïdes*, Loriol, 1898, v, 14 A, Aa, non 14, 14a, b
"St. Ives, Hunts ; Oxf. Clay" ; Geol. Surv. 30610, pres. J. Gardner
S. 9·4, 51·5, 54, 14 ; 14, 50, 42, 15·2 ; 18, 42, 36, 30·5

SCAPHITODITES NAVICULA, NOV.
Vertumniceratan, *renggeri* (*navicula*) ; Genotype, Holotype. Cf. CDLVIII

Fig 1 × 0·64

Fig. 2
× 0·48



AMMONITES TESSONIANUS ; J. BUCKMAN, 1875, cit. spec. ?
Som. Arch. N.H. Soc. Proc. XX, 146 ; " near Sherborne, Dorset "
[Sandford Lane, Foss. Bed, mid./lower pt.] ; S.B., ex Darell, Coll. 1029
S. 133, 48, 28, 16·5 ; 244, 49, 34, 19 ; size c. 250 ; max. c. 260

SHIRBUIRNIA FASTIGATA, NOV.
Sonninian, *Shirbuirnia* ; Holotype. Cf. CDXXVII

× 0·75

"AMMONITES SUBDISCUS"
"Near Sherborne, Dorset; Inf. Ool."; S.B., ex Darell, Coll. 1587
S. 93, 43, 25·5, 15; 142, 58, 24, 9·2
S. 197, 52, 19, 10·1; max. c. 200

SONNINITES CELANS, NOV.
Sonninian, *sauzei*; Holotype. See CDXXVIII

× 0·96

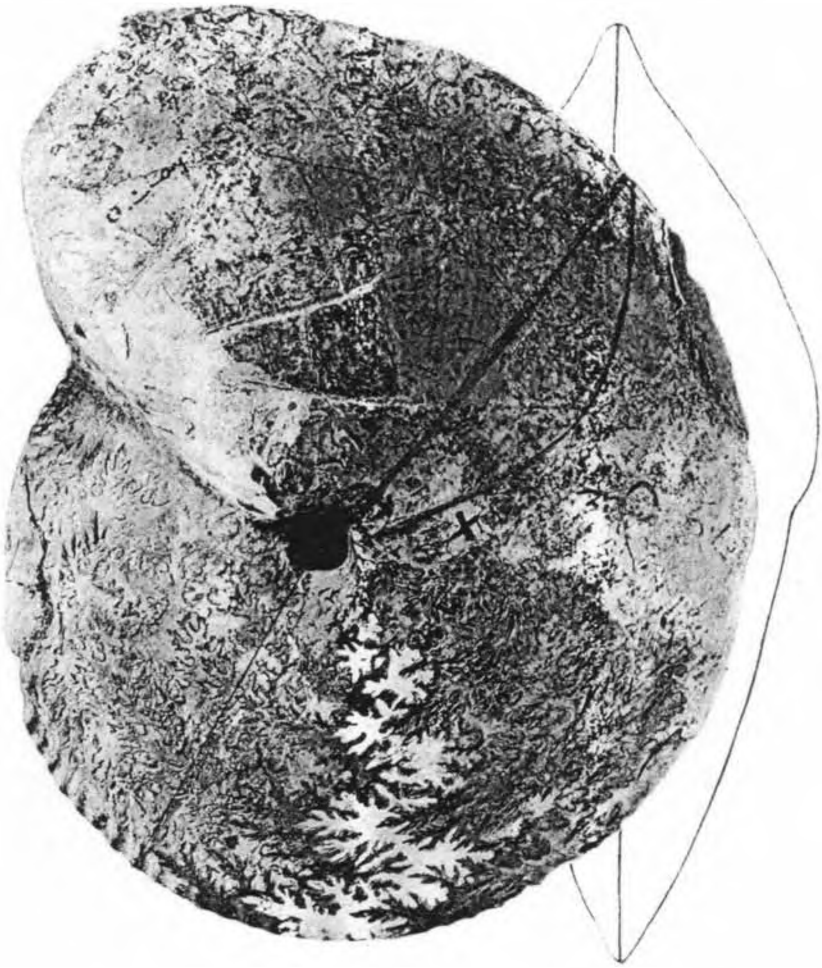
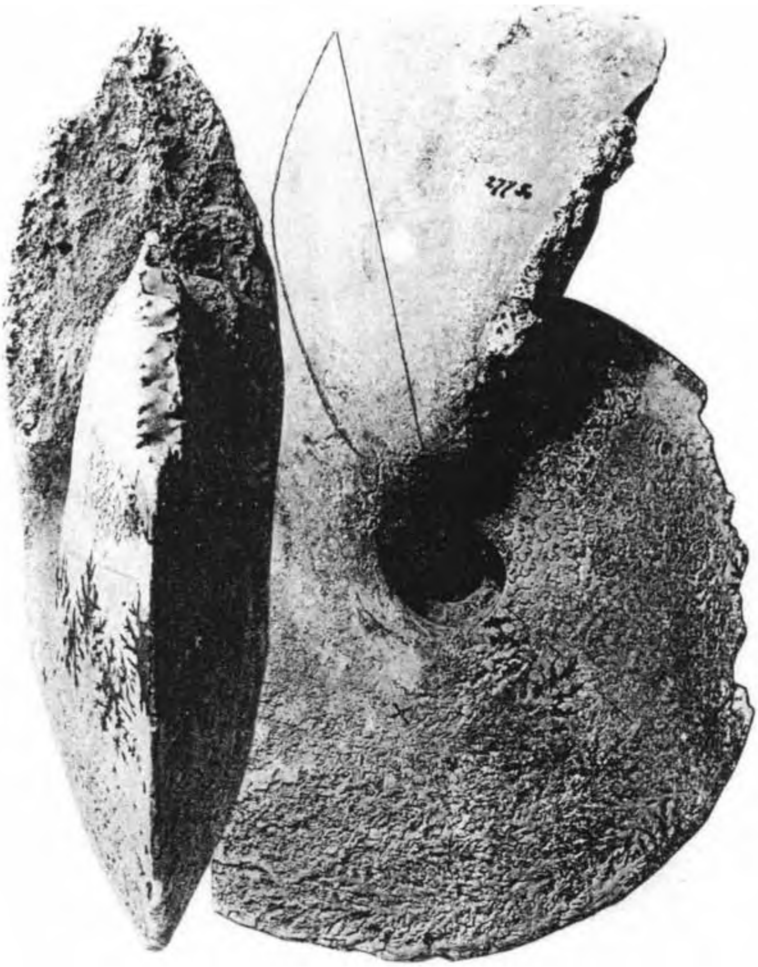


Fig. 1 Fig. 2

"AMMONITES CORDATUS, var. EXCAVATUS."
"Trowbridge, [Wilts]; Oxf. Clay," [Kellaways Clay, *a*]
Light blue clay; Geol. Survey Coll. 30393
S. 85, 54, 34? 4·7; 132, 56, 48, 6; max. c. 145

CHAMOUSSETIA LENTICULARIS, PHILLIPS SP. 1829
Proplanulitan, *majesticus*. Cf. CXLVIII

Fig. 2 Fig. 1

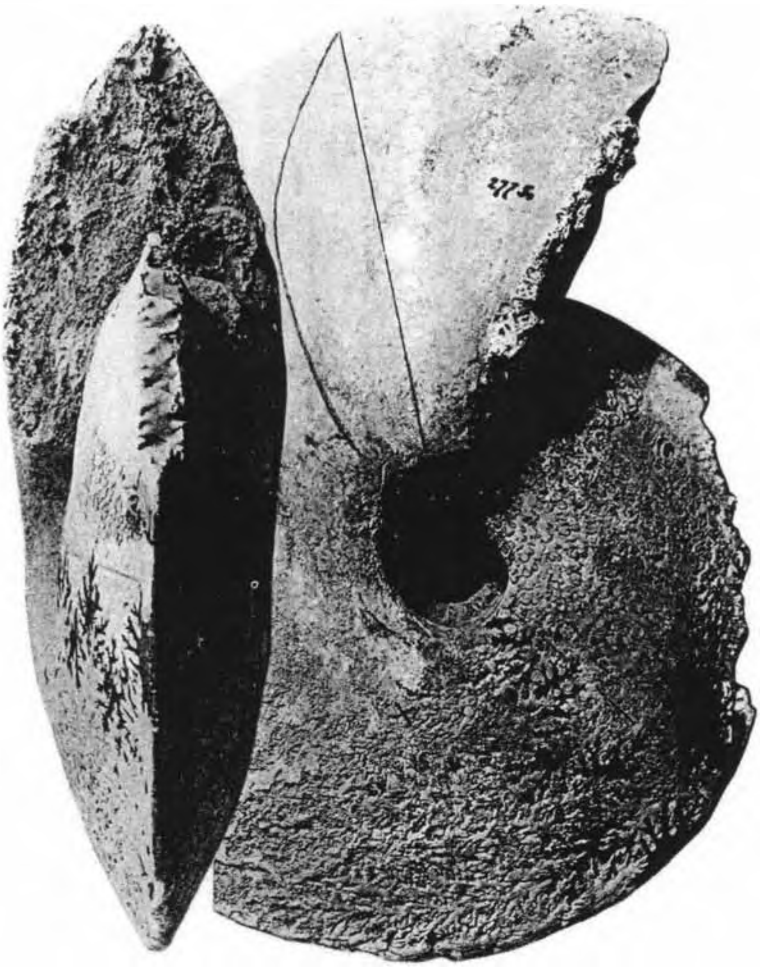


× 0·52

Ammonites excavatus, J. Sowerby, 1815, Topotype
Min. Conch. II, 5; cv; Cowley, (base of Shotover Hill), Oxford
Dogger of Lower Calc. Grit; S.B. Coll. 2775, purch.
S. 126, 52, 30, 13·8; 248, 49, 31, 15·8; max. c. 250

ANACARDIOCERAS EXCAVATUM, J. Sowerby sp.
Cardioceratan, *excavatum*. See CDXX

Fig. 2 Fig. 1



× 0·52

AMMONITES EXCAVATUS, J. SOWERBY, 1815, Topotype
Min. Conch. II, 5; CV; Cowley, (base of Shotover Hill), Oxford
Dogger of Lower Calc. Grit; S.B. Coll. 2775, purch.
S. 126, 52, 30, 13·8; 248, 49, 31, 15·8; max. c. 250

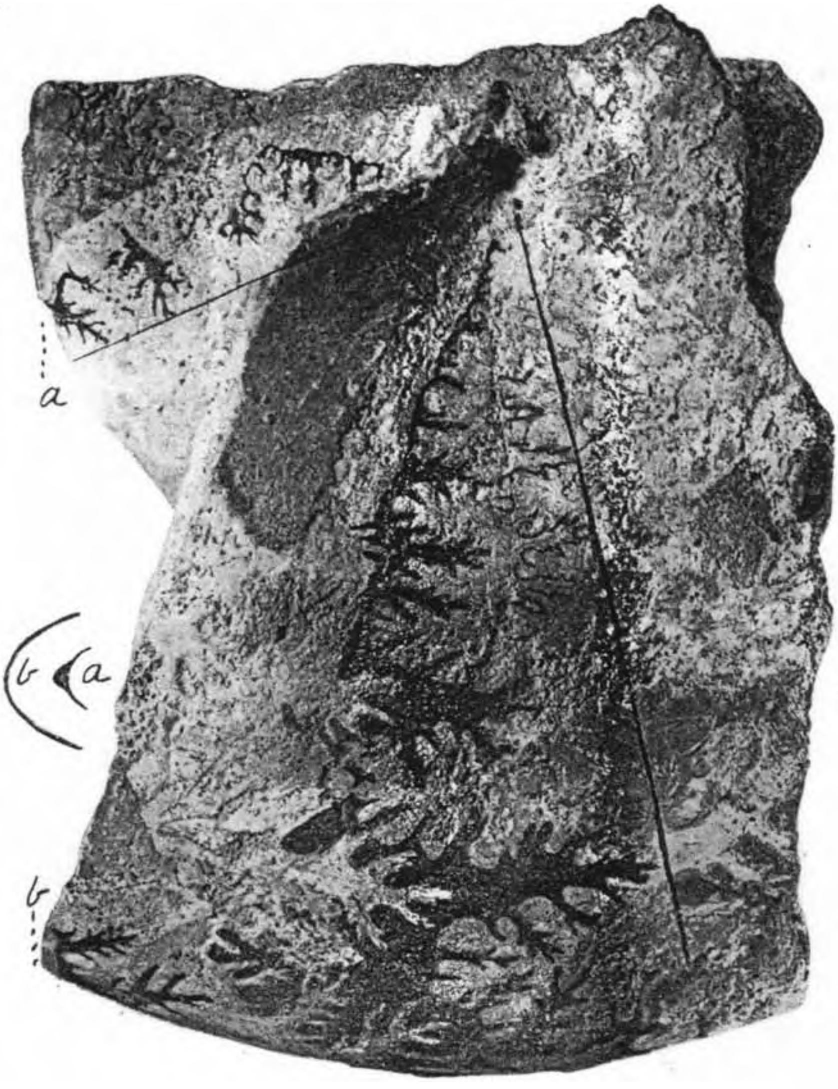
ANACARDIOCERAS EXCAVATUM, J. SOWERBY SP.
Cardioceratan, *excavatum*. See CDXX

Fig. 1 × 0·96 Fig. 2 × 0·7

"AMMONITES CORDATUS, var. EXCAVATUS"
"G. N. Ry. cutting, Walton, [Hunts]; Oxf. Clay," [Kimm. Clay]
Light blue clay; Geol. Surv. Coll. 30392, (Porter Coll.)
S. 91, 51, 33, 16·5; 169, 43, 30, 25; max. c. 175

PRIONODOCERAS EXCENTRICUM, nov.
Prionodoceratan, *prionodes*; Holotype. See CDXXI

× 1·1



AMMONITES SŒMANNI
" Kilmersdon Colliery, Radstock, Som. ; " *armatus,*" Brach. Beds
Terebratula radstockiensis in specimen ; S.B. Coll. 3003
S. (110, 53, 22·5, —) ? ; 186, 57, 24, 1·7 ; max. c. 270

PHYLLOXYNOTITES PHYLLINUS, NOV.
Polymorphitan, *phyllinus* ; Genotype, Holotype. Cf. CXLIV

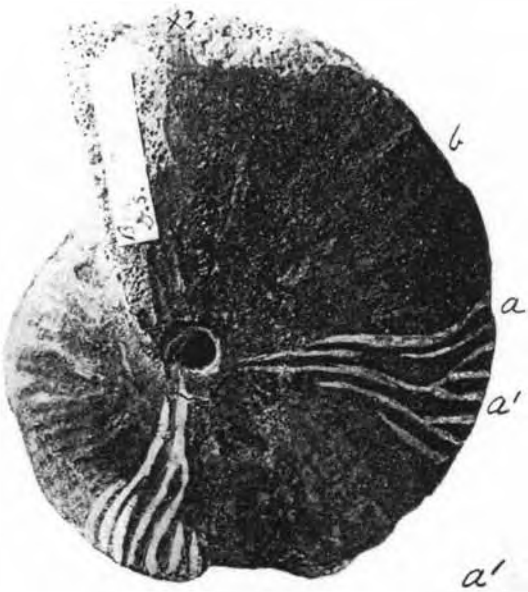


Fig. 1

Fig. 1a

Fig. 1b
×1·5

Fig. 2

AMMONITES DISCUS
[Horn Park], "Beaminster, Dorset; Inf. Ool."; Ironshot Bed
S.B., ex Darell, Coll. 1250; Fam. STRIGOCERATIDÆ
S. 57, 56, 23, 6·8; 71, 57, 21, 7·1; size c. 79; max. c. 132+

PRÆSTRIGITES PRÆNUNTIUS, NOV.
Ludwigian, *platychora*; Genotype, Holotype. Cf. CCCXVII

Fig. 1

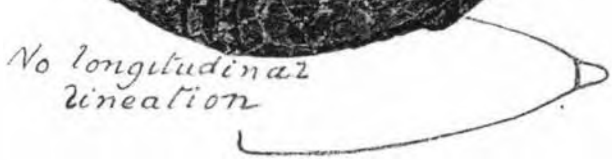


Fig. 2

AMMONITES DISCUS
Bradford Abbas, Dorset ; Inf. O., Fossil Bed ; S.B. Coll. 3987
Family Strigoceratidæ ; *Deltoidoceras* homœomorph
S. 66, 60·5, 28, 6·4 ; 84, 61, 25·5, 5·7 ; max. c. 170
(Longit. lineation lost through condition of test ?)

DELTOSTRIGITES DELTOTUS, nov.
Sonninian, *rudidiscites* ; Genotype, Holotype. Cf. CCCXVII

Fig. 1 Fig. 2

AMMONITES TRUELLEI (var. COMPRESSUS), ETHERIDGE, 1860
(In Wright, Q.J.G.S. XVI, 24) ; *Strigoceras compr.*, S.B. Id. LII, 1896, 701
" *Am. discoides*, Dundry, Som." ; J.W.T. Coll. (Cf. LII, 676, § I, 7)
Hard, whitish, with some iron grains ; Family Strigoceratidæ
S. 63 56, 22·5, 4·8 ; 82, 57·5, 22·5, 4·3 ; size and max. c. 90

VARISTRIGITES COMPRESSUS, ETHERIDGE SP.
Sonninian, *fissilobatum* ; Genotype, Topotype. Cf. CDLXVII

Fig. 1

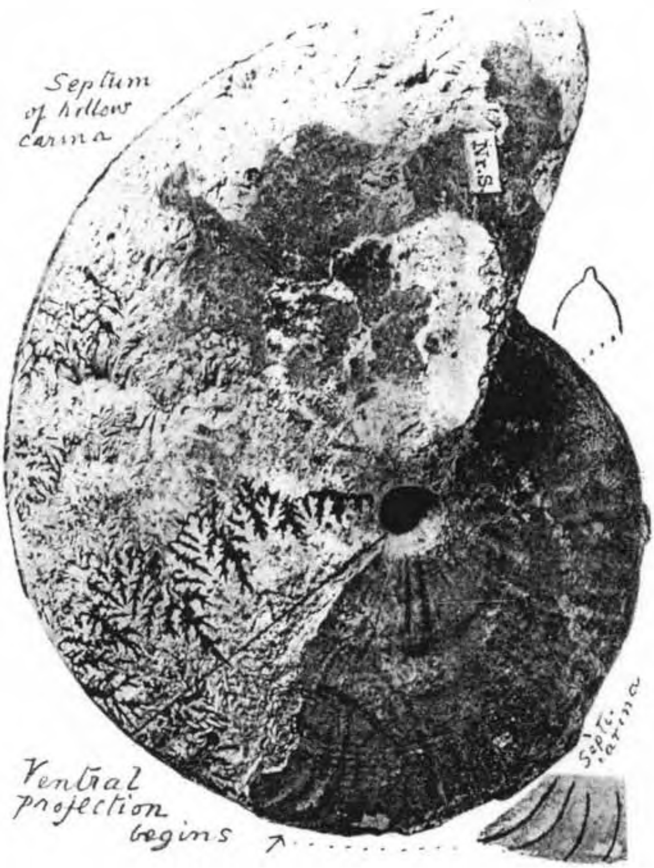


Fig. 2

Fig. 1a

AMMONITES TRUELLEI COMPRESSUS
[Clatcombe], " near Sherborne, Dorset ; Inf. Oolite "
S.B., ex Darell, Coll. 3992 ; Fam. Strigoceratidæ
S. 74, 58, 22·5, 8·1 ; 114, 61·5, 21·5, 6·1 ; max. c. 195 +

STRIGITES STRIGIFER, NOV.
Sonninian, *Witchellia* ; Genotype, Holotype. Cf. CDLXVIII

× 0·2

AMMONITES TRUELLEI COMPRESSUS
"Milborne Wick, Somerset; *Astarte spissa* Bed, *blagdeni*"
Bed with green grains. Cf. Q.J.G.S. XLIX 1893, 503, § XVII, 5
S.B. Coll. 3984, pres L. Richardson, F.G.S.
S. 31·5: 54, 26·5, 11; 43, 57, 24·5, 9·9, keel added

STRIGITES STRIGIFER, NOV.
Sonninian, *Witchellia*; Paratype. Cf. CDLXVIII

Fig. 1

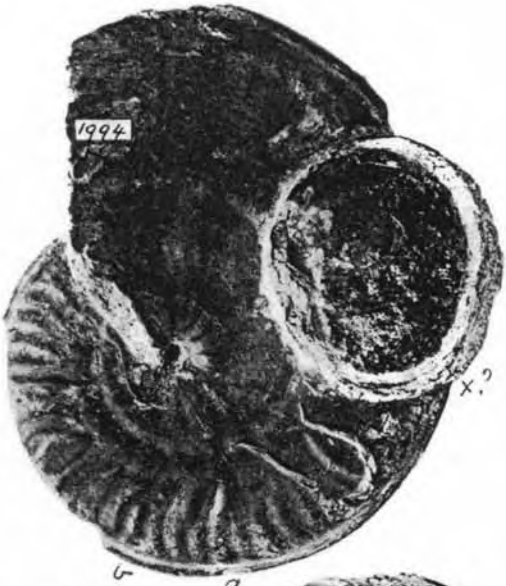


Fig. 1b

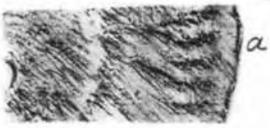


Fig. 1a

Fig. 2

AMMONITES TRUELLEI
Burton Bradstock, Dorset, Inf. Ool., Shell Bed, P.1
S.B. Coll. 1994; Fam. Strigoceratidæ
S. 56, 56, 23, 3·6; 75, 60, 22·5, 3·7; max. c. 140

STRIGITES SEPTICARINATUS, NOV.
Parkinsonian, *garantiana*; Holotype. See CDLXIX

Fig. 1

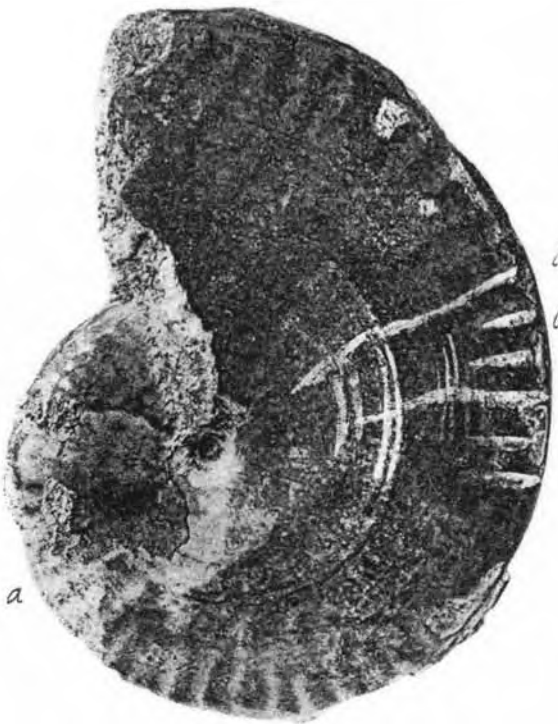


Fig. 1b

Fig. 1a

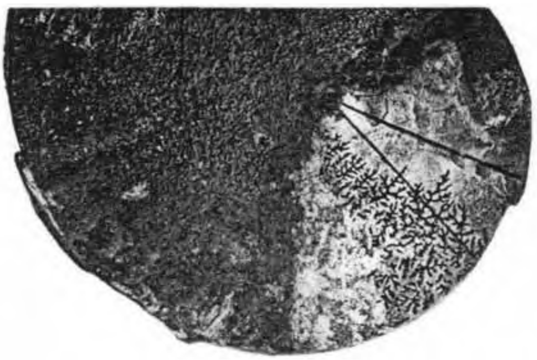
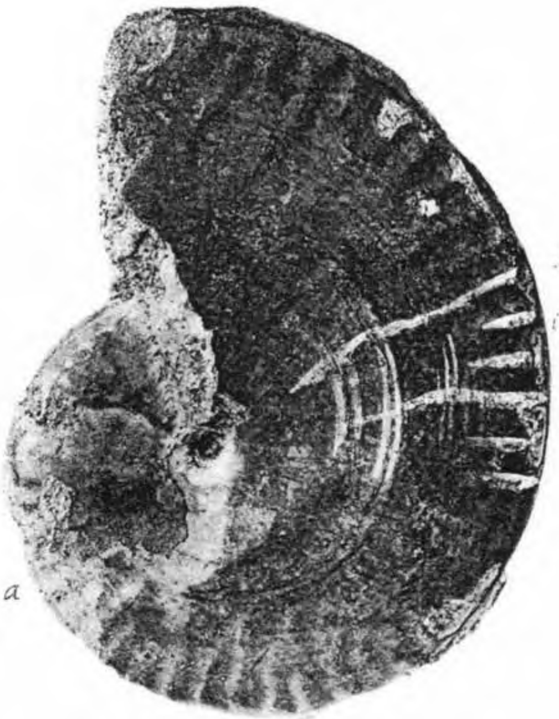


Fig. 2

STRIGOCERAS BESSINUM
Frogden Quarry, Oborne, Dorset ; Roadstone. *Hamph.* z.
Cf. Q.J.G.S. XLIX, 1893, 500, XV, 3, *Strigoceras* ; S.B. Coll. 3216
S. 62, 52·5, 22·5, 6·4 ; 95, 60, 20·5, 5·3 ; max. c. 160 +
Family Strigoceratidæ

PLECTOSTRIGITES SYMPLECTUS, NOV.
Stepheoceratan, *niortense* ; Genotype, Holotype. Cf. CDLXIX

Fig. 1



a

Fig. 1

←

Fig. 1a

a

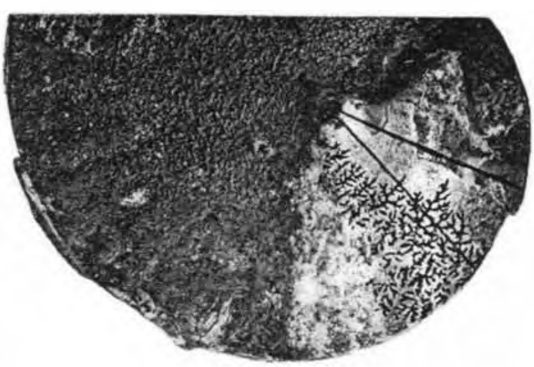


Fig. 2

STRIGOCERAS BESSINUM
Frogden Quarry, Oborne, Dorset ; Roadstone, *Humph. z.*
Cf. Q.J.G.S. XLIX, 1893, 500, XV, 3, *Strigoceras* ; S.B. Coll. 3216
S. 62, 52·5, 22·5, 6·4 ; 95, 60, 20·5, 5·3 ; max. c. 160 +
Family Strigoceratidæ

PLECTOSTRIGITES SYMPLECTUS, NOV.
Stepheoceratan, *niortense* ; Genotype, Holotype. Cf. CDLXIX

× 0·87

Fig. 1

Fig. 2

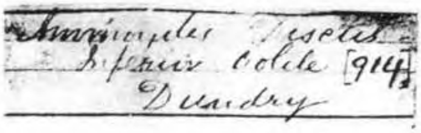
AMMONITES TRUELLEI
Burton Bradstock, Dorset; Inferior Oolite, [3rd Bed]
S.B. Coll. 3850, purch. Fam. Strigoceratidæ
S. 121, 59, 35·5, 6·5; 173, 57, 32·5, 7; max. c. 250 +

STRIGOCERAS TRUELLEI, D'ORBIGNY sp., 1846
Parkinsonian, *truellei* Cf. CDLXX. (Quen. Schw. LXIX, 7, genolect.)

Fig. 1

Fig. 2

Fig. 3



"AMMONITES DISCUS"
"Dundry, [Somerset]; Inferior Oolite," Ironshot Bed
S.B., ex Wright, Coll. 914; Fam. LISSOCERATIDÆ
S. 27, 44·5, 36, 32·5; 37, 43, 32·5, 31; max. c. 45

TOXAMBLYITES ARCIFER, NOV.
Sonninian, *sauzei*; Genotype, Holotype. Cf. CD

Fig. 1 Fig. 1a Fig. 2

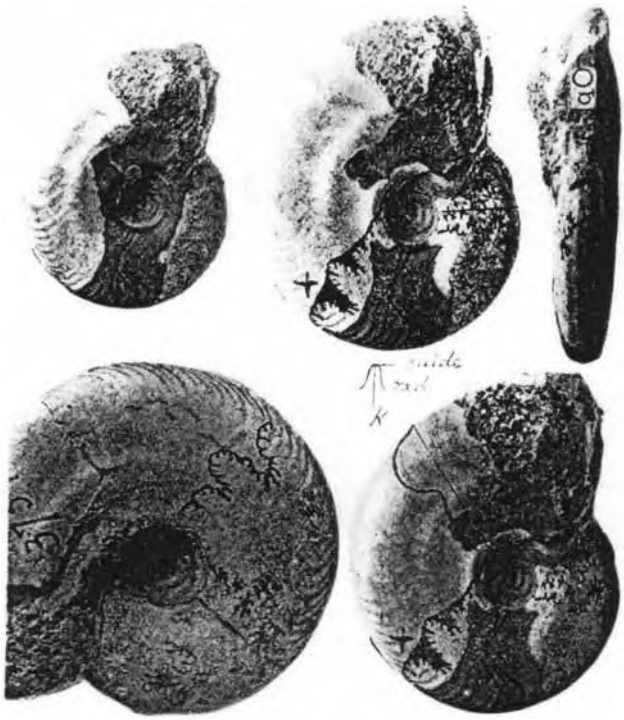


Fig. 2 × 1·7

Fig. 1b

× 1·3

AMMONITES SUBRADIATUS
Frogden Quarry, Oborne, Dorset ; Roadstone, lower part
Cf. Q.J.G.S., XLIX, 1893, 500, § xv, 8 ; S.B. Coll. 3759
S. 24·5, 51, 24·5, 21·5 ; 31, 50, 25·5, 19·4 ; max. c. 37

STEGOXYITES PARCICARINATUS, nov.
Stepheoceratan, *parcicarinatum* ; Genotype, Holotype. Cf. CDLVIII

AMMONITES TRUELLII COMPRESSUS; S. BUCKMAN, 1896, cit. spec.
Q.J.G.S., LII, 701; Dundry, Somerset: Lower White Ironshot
Cf. Id., 676, § I, 6; S.B. Coll. 3769; Fam. HEBETOXYITIDÆ
S. 43, 51, 27, 5·2; 62, 59, 25, 4·4: max. c. 70

HEBETOXYITES HEBES, NOV.
Sonninian, *mellis* (*hebes*): Genotype, Holotype. Cf. CCCXVII

Fig. 1 Fig. 1a

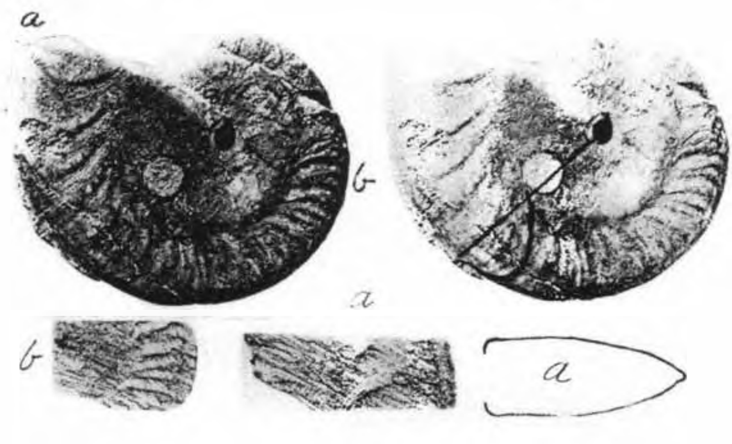


Fig. 1b Fig. 1c Fig. 2

AMMONITES WATERHOUSEI, MORRIS & LYCETT, 1850, Holotype
G.O. Moll. 13; 1, 4; Minchinhampton, Glos.; Great Oolite
Matrix white, very oolitic limest.; Geol. Survey 25619
S. 30, 53, 27·5, 9·2; 47, 57·5, 24·5, 5·8; max. c. 75 –

OXYCERITES WATERHOUSEI, MORRIS & LYCETT SP.
Oxyceritan, *waterhousei*. Cf. CDLXXV

TYPE AMMONITES—V

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

PART XLV

Pages 5-20; 16 Plates and two Reprints

PUBLISHED BY THE AUTHOR

SOLD BY

WHELDON & WESLEY, LTD.

2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET

LONDON, W.C. 2

April, 1924

CONTENTS

PART XLV

CHELTENHAM
NORMAN, SAWYER AND CO. LTD., PRINTERS
ST. GEORGE'S HALL

Fig. 1

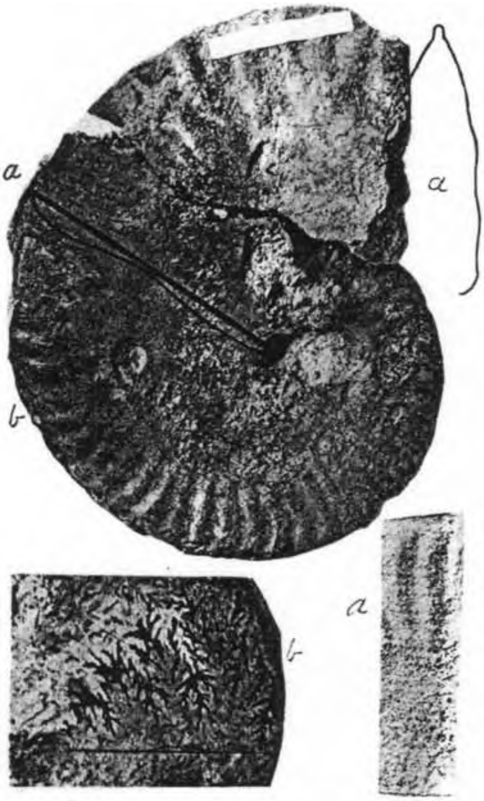
Fig 2
× 2

STRIGOCERAS SP., S. BUCKMAN, 1893, cit. spec.
Q.J.G.S., XLIX, 494 ; "Sandford Lane, Sherborne, Dorset
"Fossil Bed, upper part" ; S.B. Coll. 4002 ; Strigoceratidæ
S. 30, 55, 27, 10 ; 58, 56, 23, 6·9 ; max. c. 90

LEPTOSTRIGITES LANGUIDUS, NOV.
Sonninian, *Labyrinthoceras* ; Genotype, Holotype. Cf. CDLXIX

Fig. 1 Fig. 3

Fig. 2 Fig. 1a



Ammonites truellii compressus; S. Buckman, 1896, cit. spec.
Q.J.G.S., LII, 701; " Dundry, Somerset, South Main Rd. Quarry
Upper White Ironshot "; S.B. Coll. 3218; Strigoceratidæ
S. 34, 55, c. 27, 9·6; 75, 57, 20, 5·3; max. c. 150

LEPTOSTRIGITES LANGUIDUS, nov.
Sonninian, *Labyrinthoceras*; Paratype. Cf. CDLXIX

Fig. 1

Fig. 3

Fig. 2 × 1·4

Fig. 2a × 1·4

AMMONITES SUBRADIATUS
" Burton Bradstock, Dorset ; Inf. Ool.," [3rd Bed]
S.B. ex Darell Coll. 986 ; L1 slightly different two sides
S. 35, 47·5, 28·5, 25 ; 69, 53, 25, 16·5 ; max. c. 75

PLEUROXYITES PLEURIFER, NOV.
Parkinsonian, *truellei* ; Genotype, Holotype. Cf. CLXXVII

Fig. 1 Fig. 2

Fig. 3

" AMMONITES DISCUS "
" Whatley, [near Frome, Somerset]; Inf. O. with *Serpulæ* "
[Basal Fullers' Earth]; J.W.T. Coll., purchased
"S. 61, 51, 18, 11; 118, 55, 20, 10"; max. c. 190

PLEUROXYITES KNAPHEUTICUS, NOV.
Zigzagiceratan, *knapheuticus*; Holotype. See CDLXXVIII

AMMONITES DISCUS
" Loders, Bridport, Dorset ; Inferior Oolite, top beds "
Cf. Burton Bradstock, 2nd Bed ; S.B. Coll. 3978
S. 54, 53, 27, 27 ; 128, 56, 22, 15 ; max. c. 215

HARPOXYITES HARPOPHORUS, NOV.
Parkinsonian, *schloenbachi* ; Genotype, Holotype. Cf. CDLXXVIII

Fig. 1

Fig. 1a

Fig. 2

AMMONITES SUBRADIATUS
"Bradford Abbas. [East Hill], Dorset; Inf. Ool." [top beds]
Cf. Q.J.G.S. XLIX, 1893, § II, 3; S.B., ex J.B., Coll. 3988
S. 35, 46, 24·5, 23; 72, 57, 21, 14·5; max. c. 130+

GONOXYITES GONIOPHORUS, NOV.
Parkinsonian, *schloenbachi*; Genotype, Holotype. Cf. CDLXXVIII

Fig. 2b

Fig. 2a

Fig. 2

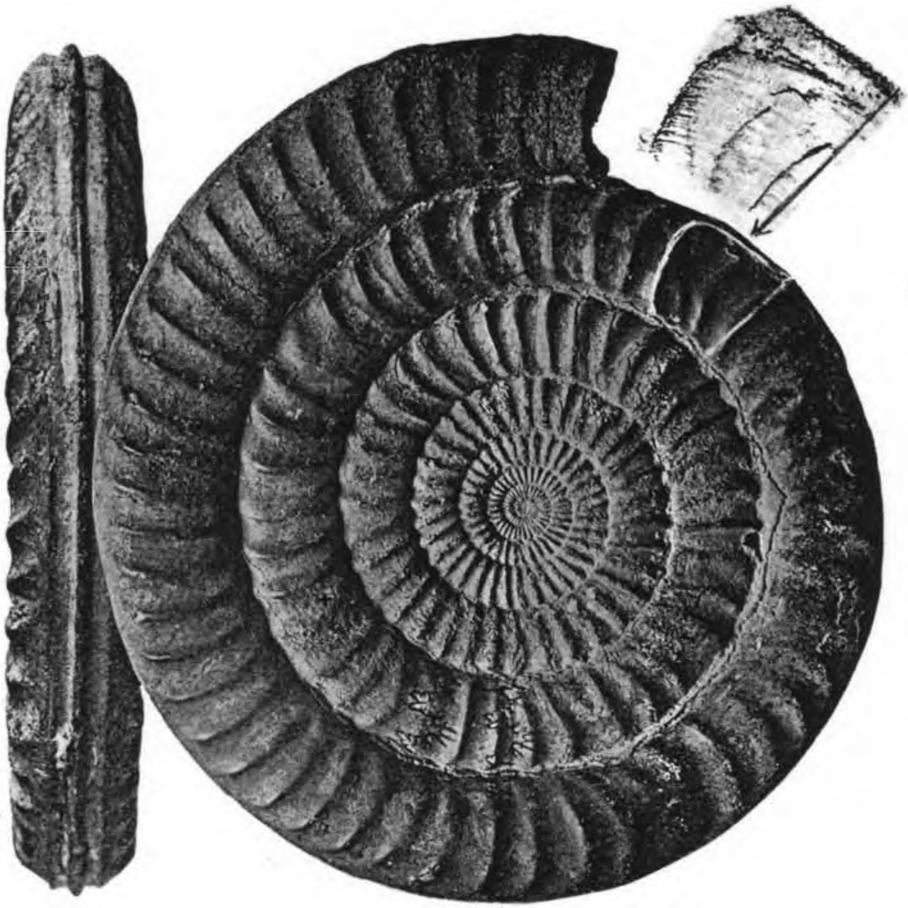
Fig. 1
× 0·56

Fig. 3

CALOCERAS APLANATUM, HYATT
Echioceras, S.B. ; " Radstock Grove, Radstock, Som. ; base of *armatus*"
J.W.T. Coll. 132 ; S. 90, 20, 15·5, 60 ; 68 ribs
S. 117, 19, 14·5, 62 ; 77 ribs ; 168, 18, 14, 66
S. 197, 17, 13·5, 68 ; size 218 ; max. c. 225 ; Body ch. $1\frac{1}{4}$ wh.

LEPTECHIOCERAS APLANATUM, HYATT SP. 1889
Deroceratan, *aplanatum* ; Holotype. See CDXLIII and fig. 1, p. 15

Fig. 2 X 0·72 Fig. 1 Fig. 1a N.S.



ARIETITES STUDERI
Echioceras, S.B. ; " Radstock Grove, Radstock, Som. ; base of *armatus*"
J.W.T. Coll. 135 ; S. 73, 23·5, 20·5, 57·5
S. 113, 20.5, 18, 62 ; 156, 18, 15, 67 ; 50 ribs ; max. c. 160

PALTECHIOCERAS ELICITUM, NOV.
Deroceratan, *aplanatum* ; Genotype, Holotype. Cf. CDXXV

Fig. 1

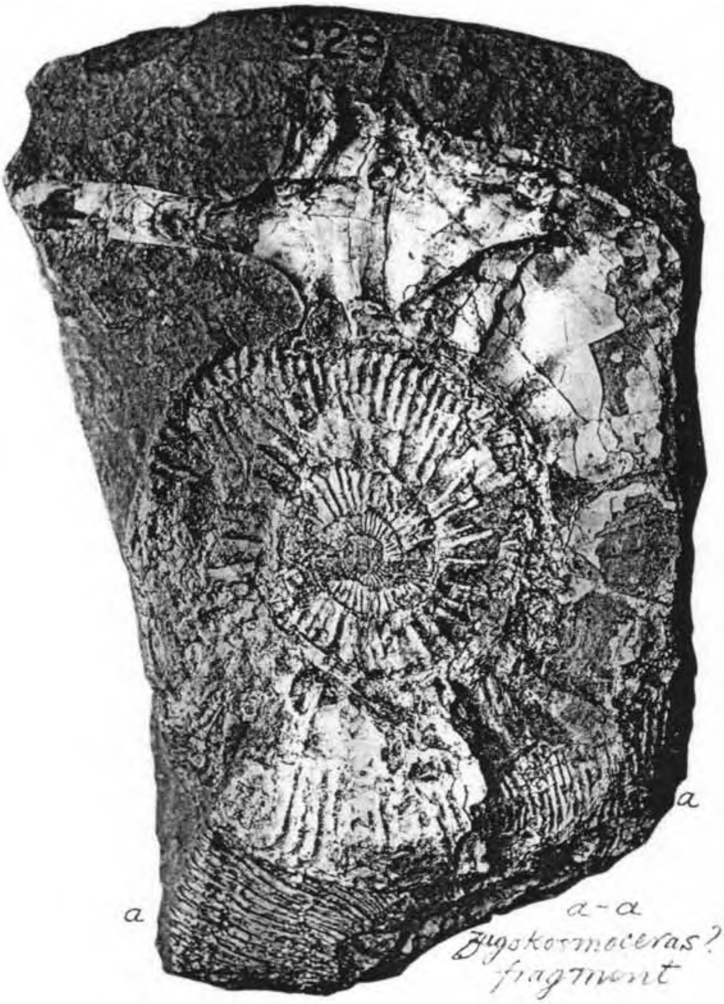
Fig. 3a

Fig. 2

Fig. 3

MORPHOCERAS TRANSYLVANICUM ; Grossouvre
(1918, B.S.G. Fr. 3 (4) XVIII, 390 ; XIV, 1, 2, non Simionescu 1905)
" *Ammonites martinsii* ; Midford, Somerset ; Fullers' Earth "
J.W.T. Coll., purch. ; S. 38, 38, 34, 31 ; 64, 29·5, 25. 47 ; max. c. 70

ASPHINCTITES RECINCTUS, NOV. (Fig. 3, p. 18)
Zigzagiceratan, *recinctus* ; Genotype, Holotype. Cf. CCCLIX

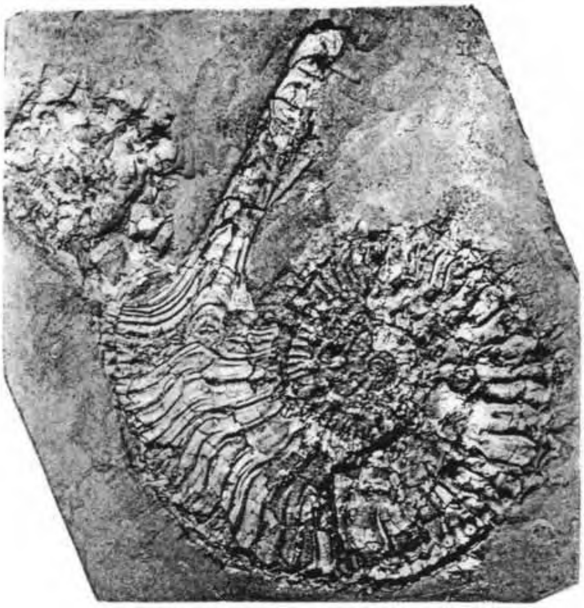


AMMONITES COMPTONI, PRATT, 1841. Holotype
Ann. Mag. N.H. VIII, 163, 165 ; IV, 1 ; "Christian Malford, Wiltshire
Christian Malford Clays ;" Imp. Coll. Sci., S. Kensington, 329
Φ. 58, 34·5, —, 36 ; 77, 36, —, 37 ; " S. 102, 30, —, 42," V.E.R.

BINATISPHINCTES ? COMPTONI, PRATT SP.
Kosmoceratan, *zugium*. See CCLXI

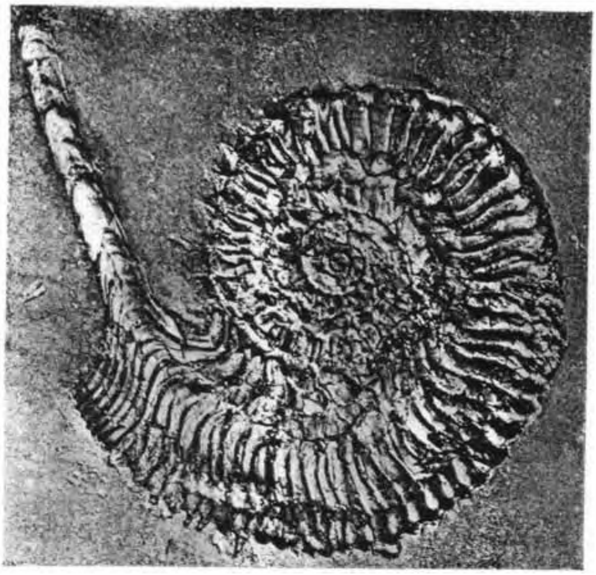
Fig. 2
see Pl.
CDLXXXVII

Fig. 1



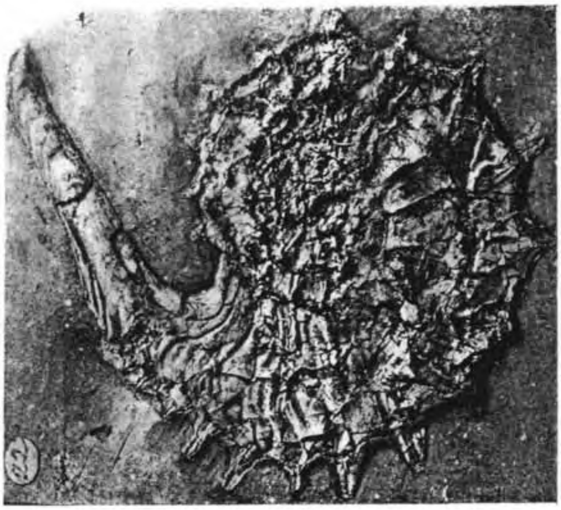
AMMONITES ELIZABETHÆ, PRATT, 1841, Paratype
Ann. Mag. N.H. VIII, 162, 165; III, 2; "Christian Malford, Wiltshire "Oxford Clay," [Christian Malford Clays]; Bristol Museum (Stutchbury Coll.); "*Cosmoceras acutistriatum*," V.E.R. MS.
Φ 31·5, 40, —, 25; "S. 60, 38, —, 32" V.E.R.; lat. aur. 41 mm.

SPINIKOSMOKERAS ACUTISTRIATUM, ROBSON MS. SP.
Kosmoceratan, *acutistriatum*; Genotype, Holotype. Cf. CDXXXVII



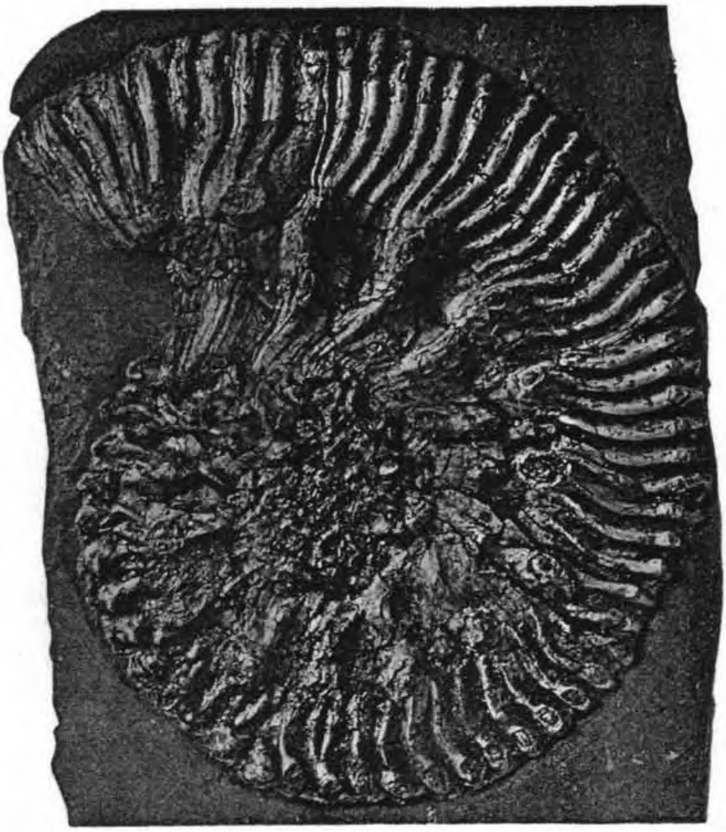
"AMMONITES JASON"
"Christian Malford, [Wiltshire]; Oxford Clay," [Christian Malford Clays]
Geol. Surv. (Cunnington Coll.) 30487
S. 31, 41, —, 25; 68, 39·5, —, 31; lat. aur. 47 mm.

SPINIKOSMOKERAS ACUTISTRIATUM, ROBSON SP.
Kosmoceratan, *acutistriatum*; Plesiotype; Cf. CDXXXVII



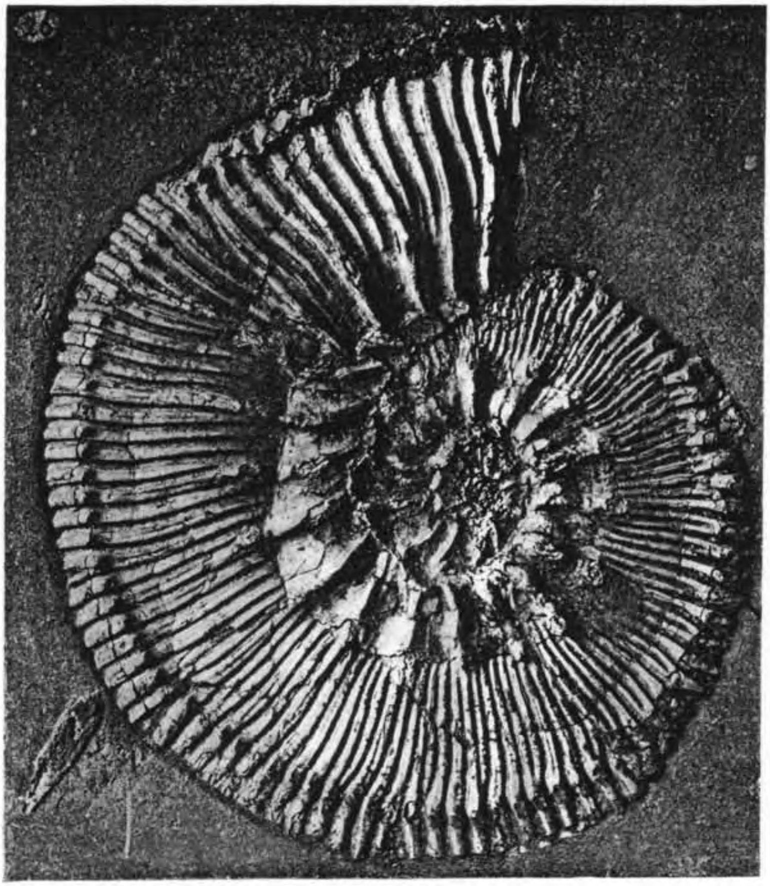
AMMONITES ELIZABETHÆ, PRATT
(Cf. 1841, III, 1); "*Am. jason*; Christian Malford, [Wiltshire] Oxford Clay," [C. M. Clays]; Geol. Surv. 30499
S. 28, 36, —, 28·5; 62, 35·5, —, 34; Lat. aur. c. 40 mm.

SPINIKOSMOKERAS POLLUX, REINECKE SP. 1818
Kosmoceratan, *pollux*; Plesiotype. See CDLXXXVI



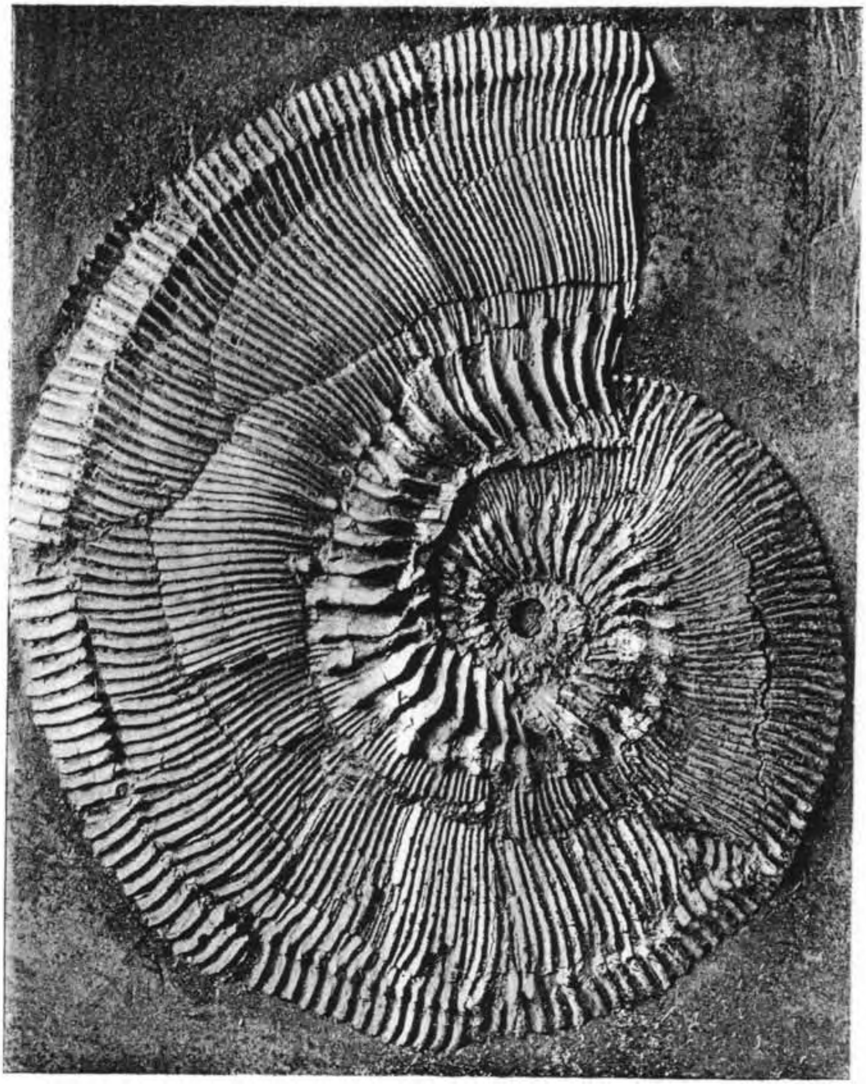
" AMMONITES JASON "
" Christian Malford, [Wiltshire] ; Oxford Clay " ;
[Christian Malford Clays] ; Geol. Survey 30490 ;
S. 52, 41, —, 25 ; 78, 42, —, 24 ; 112, 38, —, 30

HOPLIKOSMOKERAS HOPLISTES, nov.
Kosmoceratan, *hoplistes* ; Genotype, Holotype. Cf. CCCLXXXIX



" AMMONITES JASON "
" Christian Malford, [Wiltshire], Oxford Clay " ;
[Christian Malford Clays] ; Geol. Survey 30498
S. 49, 41, —, 26·5 ; 74, 44·5, —, 26 ; 100, 34, —, 35

HOPLIKOSMOKERAS FIBULIFERUM, NOV.
Kosmoceratan, *hoplistes* ; Holotype. See CDLXXXVIII



AMMONITES GULIELMI, PRATT, 1841, cit. spec.
Ann. Mag. N.H. VIII, 164; "*Ammonites jason*, var. *gulielmi*"
"Christian Malford, [Wiltshire]; Oxford Clay," [Christian Malford Clays]
Geol. Survey 30514, pres. S. P. Pratt
S. 61, 45·5, —, 17; 88, 51, —, 16; 124, 41, — 26

HOPLIKOSMOKERAS PHAEINUM, nov.
Kosmoceratan, *hoplistes*; Holotype. See CDLXXXIX

TYPE AMMONITES—V

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

The Author

Part XLVI
Pages 21-28; 16 Plates

Published by the Author

Sold by

WHELDON & WESLEY, Ltd.

2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET

LONDON, W.C. 2

June, 1924

CONTENTS

Part XLVI

CHELTENHAM
NORMAN, SAWYER AND CO. LTD., PRINTERS
ST. GEORGE'S HALL

Fig. 1a ×2·9 Fig. 1 ×2·2

AMMONITES TUBELLUS, SIMPSON, 1855, Paratype
Foss. Yorksh. Lias, p. 42 ; " Beach close to Bay-town ; L.L."
[Robin Hood's Bay ; Lower Lias] ; Whitby Museum, 868
S. 6·3, 32, 32, 48 ; 10·9, 39, c. 37, 51 ; max. c. 14

DEROCERAS ANGUIFORME, SIMPSON SP. 1843
Deroceratan, *anguiforme*. See XLIV

Fig. 1

× 2

Fig. 3

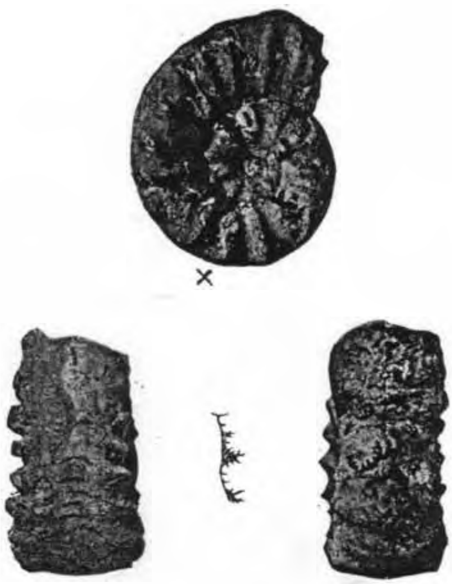


Fig. 2

Fig. 4 N.S.

AMMONITES CENTAURUS
"Tyning Colliery, Radstock, Somerset; top beds (*valdani*)"
J.W.T. Coll.; S. 9·1, 41, 77, 22; 16, 37·5, 41, 42·5

BEANICERAS SENILE, S. BUCKMAN 1918
Liparoceratan, *Beaniceras*; Idiotype. See LXXIII

×4

Fig. 1

Fig. 2

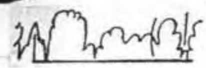


Fig. A
From another species

Paltopleuroceras spinatum ; J. F. Jackson, 1922, cit. spec.
Q.J.G.S., LXXVIII, 443, § vi, P. ; "Thorncombe Beacon, Dorset
" *serrata* " ; S.B. Coll. 3953, pres J. F. Jackson (5167)
S. 3·15, 32, 89, 33 ; 6·5, 30, 60, 43 ; max. c. 8·5 ; Brephomorph
(Fig. A, *Palt. pseudocostatum* ; copy S.B., Q.J.G.S., XLV, 1889, xxii, 1)

PALTOPLEUROCERAS BUCKMANII ? Moxon sp. 1841
Domerian, *spinatum* ?

Fig. 1 × 2·2 Fig. 2

Fig. 3
× c. 6

Fig. 1b × 3·1 Fig. 1a

AMMONITES TUBELLUS, SIMPSON, 1855, Holotype
Foss. Yorks. Lias, p. 42 ; " Beach close to Bay-town ; L. L."
[Robin Hood's Bay ; Lower Lias] ; Whitby Museum, 981
S.+Φ. 3·8, 36, 36, 38 ; S. 7·5, 33·5, 29, 42·5 ; size and max. 8·1

TUBELLITES TUBELLUS, SIMPSON SP.
Deroceratan, *tubellus*. Cf. LXIV

× 1·4

Fig. 1

Fig. 2

ANCYLOCERAS COSTATUM
" Vetney Cross, near Bridport, Dorset ; I.O., [Shell Bed] "
S.B., ex Darell, Coll. 1148 ; H. : T., 4 : 4 ; 6·5 : 6
Faint trace of inner row of nodes about mid. b.-ch.

SPIROCERAS TOXOCONICUM, nov.
Parkinsonian, *garantiana* ; Holotype. Cf. CCCLXXIV

× 0·57

AMMONITES CYMODOCE

Rasenia uralensis, Auctt.; "Ringstead Bay, Dorset; Kim. Cl. [25]"
See T.A. IV, 35, 38; S. B. Coll. 3955, purch.; shows septal decline
S. 162, 31, 27, 43; 262, 29, 27, 46; mouth slightly swollen

TRIOZITES SEMINUDATUS, NOV.

Rasenian, *uralensis*; Genotype, Holotype. Cf. CCCLXXXIV

× 0·25

AMMONITES GIGANTEUS
" Scotsgrove, Haddenham, Bucks ; Portl. Stone," brown matrix
[Osses Ed, near top] ; one side much broken
Inner whorls cadiconic, almost tuberculate, cf. *Teloceras*

HIPPOSTRATITES HIPPOCEPHALITICUS, NOV.
Gigantitan, *hippocephaliticus* ; Genotype, Holotype. Cf. CCCLXXXV

Fig. 1 × 0·31

Fig. 2 N.S

AMMONITES GIGANTEUS
" Scotsgrove, Haddenham, Bucks ; Portl. Stone "
S.B. Coll. 3820, purch. ; EL, 52, L1, 52, L2, 32 of 116 mm.
S. 325, 35, 34, 37 ; 485, 32, c. 29, 46 ; max. c. 500

HIPPOSTRATITES HIPPOCEPHALITICUS, NOV.
Gigantitan, *hippocephaliticus* ; Genotype, Holotype

Fig. 2

Fig. 1

AMMONITES DISCUS; J. BUCKMAN, 1876, cit. spec.
Q.J.G.S., XXXIII, 7; [Sandford Lane], "near Sherborne, Dorset"
[Fossil Bed, middle part]; S. B., ex Darell, Coll. 1261
S. 80, 57·5, 22·5, 5; 153, 59·5, 22·5, 3·3; max. c. 185

HEBETOXYITES CLYPEUS, NOV.
Sonninian, *Witchellia* (*mollis*); Holotype. See CDLXXV & V, p. 8.

Fig. 1

Fig. 2

STRIGOCERAS SP.
" Sandford Lane, Sherborne, Dorset ; Foss. Bed, middle part "
S.B. Coll. 3896 ; S. 34·5, 51, 24, 12 ; 70, 57, 23, 7·5 ; max. c. 105

HEBETOXYITES CLYPEUS, NOV.
Sonninian, *Witchellia* (*mollis*) ; Paratype. See CDLXXV

Fig. 1

Fig. 2

Fig. 1a
× 3·1

AMMONITES TRUELLII COMPRESSUS
" Sandford Lane, Sherborne, Dorset ; Foss. Bed, *Brocchii* z."
S.B. Coll. 4003 ; Radial lineation crosses from rib 1 to 3
S. 35, 54, 22·5, 8·6 ; 60, 60, 20, 5 ; max. c. 70

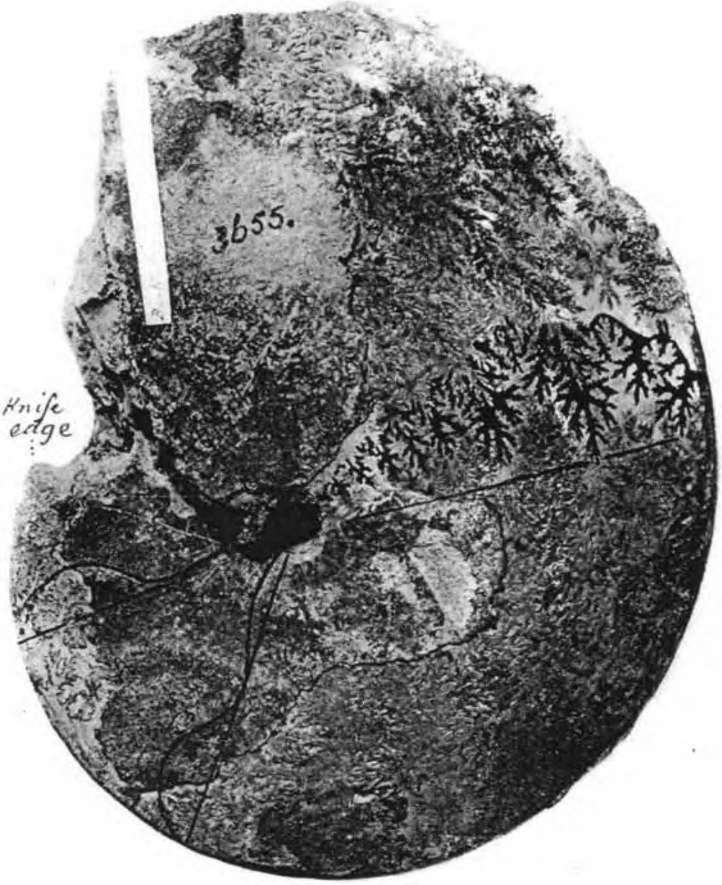
HEBETOXYITES INCONGRUENS, NOV.
Sonninian, *Witchellia* (*mollis*) ; Holotype. See CDXCVI & V, p. 9

Fig. 1a

Fig. 1

AMMONITES DISCUS
"Stoford, Somerset"; (Q.J.G.S. XLIX, 1893, § 1, between 10, 11)
[Fragment of later bed in pocket of 10 ?], side of specimen worn
S.B. Coll. 4010, purch.; S. 40, 55, 21, 6·9; 86, 60, 21, 3·5; max. c. 180

HEBETOXYITES MACILENTUS, NOV.
Sonninian, *Witchellia* (*mollis*); Holotype. See CDXCVII & V, p. 8



AMMONITES DISCUS
Oppelia fallax; S.B.; " Burton Bradstock, Dorset "
" Inf. Ool.," [top bed, *zigzag*]; S.B., ex Darell, Coll. 3655
S. 63, 54·5, 21·5, 11; 115, 57, 21·5, 6·1; size c. 125; max. c. 200+

HARPOXYITES FALLAX, GUERANGER SP. 1865
Zigzagiceratan, *zigzag*; Holotype. See CDLXXX

Fam. CLYDONICERATIDÆ

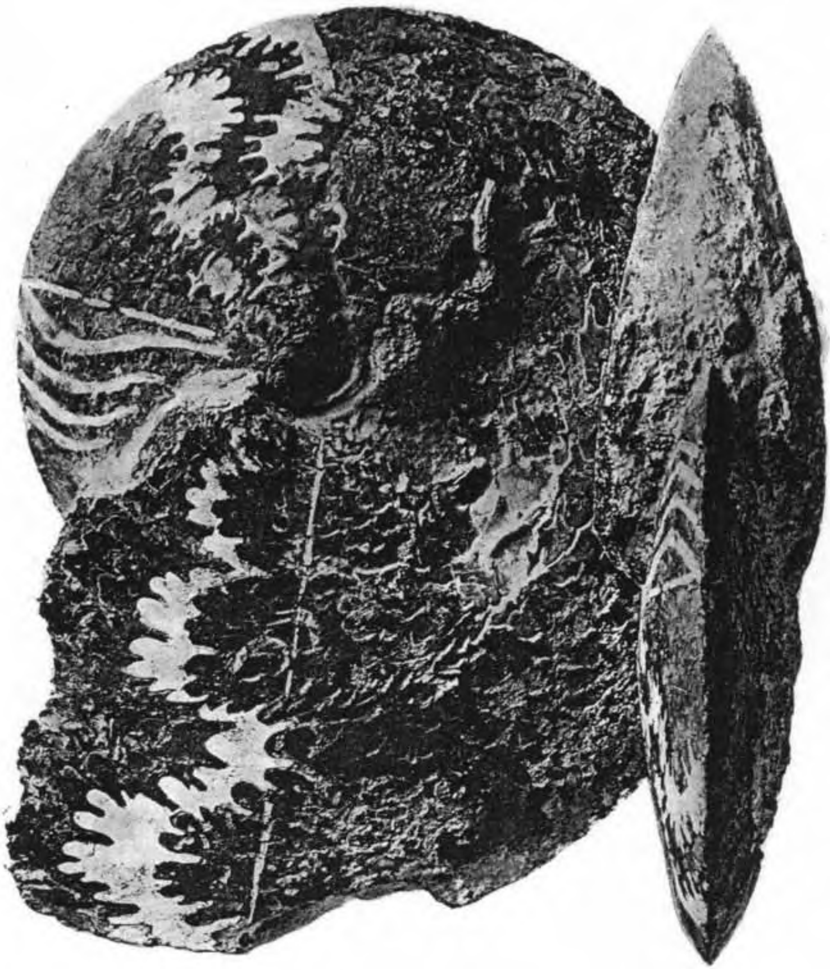


Fig. 1 Fig. 2

AMMONITES DISCUS; LYCETT, 1863, Plesiotype
G.O. Moll., Suppl., 4; XLI, 8; "Tetbury Road Station, [Glos]"
"Bradford Clay," [derived ex Acton-Turville Beds equiv.]
A. hollandi, J. B[UCKMAN] MS.; Univ. Coll., Nottingham
S. 67, 57, 27, c. 8; 132, 57·5, 24, 6·8; max. c. 250

HARPOCERATIDARUM HOLLANDI, J. BUCKMAN MS. SP., c. 1857
Clydoniceratan, *hollandi*; Genotype, Holotype. See p. 25; Cf. CDXCIX

Fig. 1a × 3

Fig. 2

Fig 1

Fig. 1b × 3

Fig. 3 × 3

AMMONITES BRIGHTI, PRATT, 1841, Paratype
Ann. Mag. N. H., VIII, 164, 165 ; VI, 4 ; " Christian Malford, Wiltshire
" Oxford Clay," [above C. M. Clays] ; Bristol Mus., C.1804
(Stutchbury Coll.) ; S. 14, 30·5, 28·5, 37·5 ; 26, 38, 27, 38 ; max. c. 28

LUNULOCERAS RURSICOSTATUM, ROBSON MS.
Kosmoceratan, *sævum* ; Holotype. Cf. CCXCVII

TYPE AMMONITES—V

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

The Author

Part XLVII
16 Plates

Published by the Author

Sold by

WHELDON & WESLEY, Ltd.
2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET
LONDON, W.C. 2

August, 1924

CONTENTS

PART XLVII

CHELTENHAM
NORMAN, SAWYER AND CO. LTD., PRINTERS
ST. GEORGE'S HALL

Fig. 2

Fig. 1

Fig. 1a × 1·3

Fig. 3

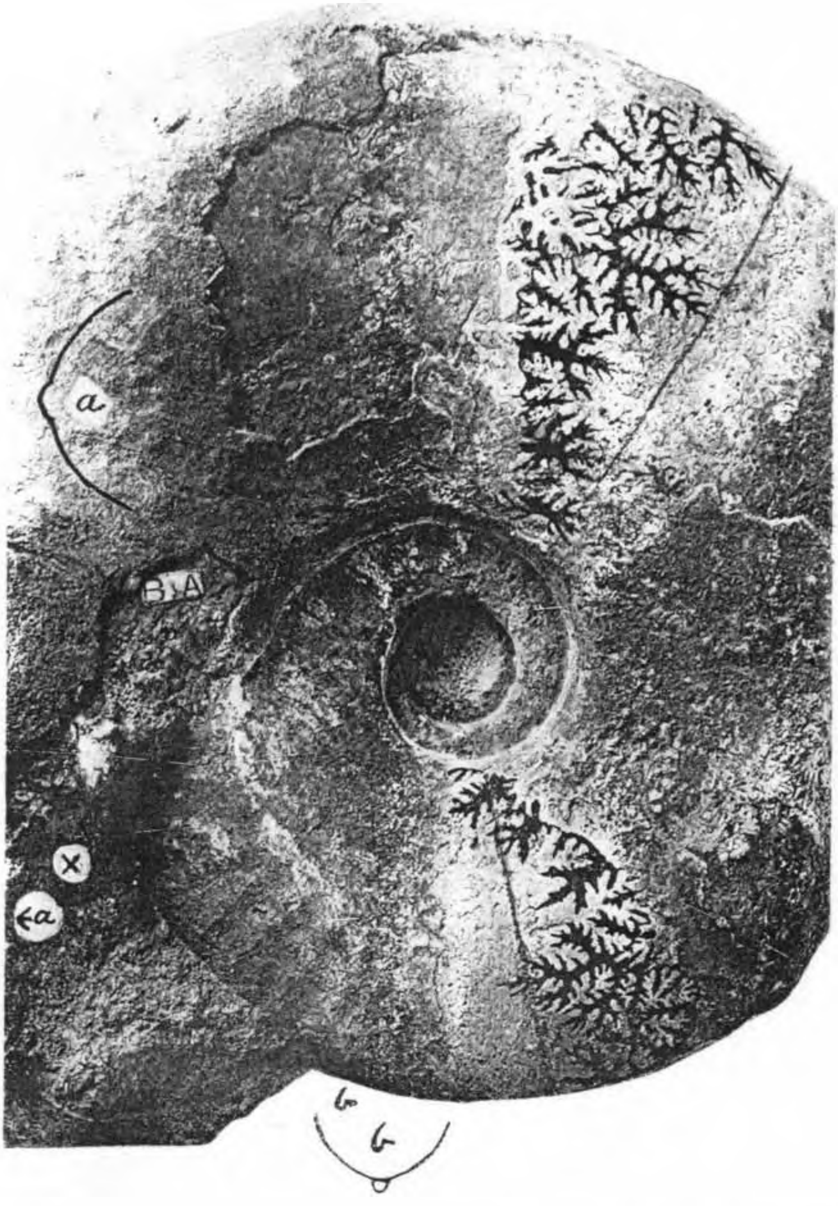
AMMONITES FLUCTUOSUS, PRATT, 1841, Paratype
Ann. Mag., VIII, 164, 165 ; VI, 1 ; "Christian Malford, Wilts ; Oxf. Clay"
Bristol Mus., C. 1802, (Stutchbury Coll.) ; "*Peltoceras* sp.," V. E. R.
S. 39, 33, 25, 41 ; c. 46 ribs ; 66, 33·5, c. 24·5, 44 ; 49 ribs ; max. c. 100

PELTOCERAS SUBTENSE, BEAN SP. (Leckenby, 1859)
Kosmoceratan, *subtense*

Fig. 2a

Fig. 1

Fig. 2



HAMMATOCERAS CLIMACOMPHALUM; S. BUCKMAN, 1889, cit. spec.
Q.J.G.S., XLV, 660, 661; "Bradford Abbas, (Railway), Dorset"
"*Concavum* z."; S.B. Coll. 545; S. 71, —, c. 28, 23; 98, 47·5, 26·5, 19
S. 176, 43, 22, 25·5; max. c. 245; septicar. obsolescent

EUAPTETOCERAS INFERNENSE, ROMAN SP. 1913
Sonninian, *Eudmetoceras*. See CCXCIX

AMMONITES LONSDALII, PRATT, 1841, Holotype
Ann. Mag. N.H., VIII, 164, 165; v., 2; "Christian Malford, Wilts"
C. M. Clays; Bristol Mus., C. 1801, (Stutchbury Coll.)
Φ. 28, 50, —, 12·5; 45, 53, —, 13; 70, 50, —, 15; "S. 71, 53? —, 10?
"About 14 arcuate ribs separated by 2 or 3 intermed." V. E. R.

LUNULOCERAS LONSDALII, PRATT SP.
Kosmoceratan, *acutistriatum*. See DI

× 3·4

Fig. 1
N.S.

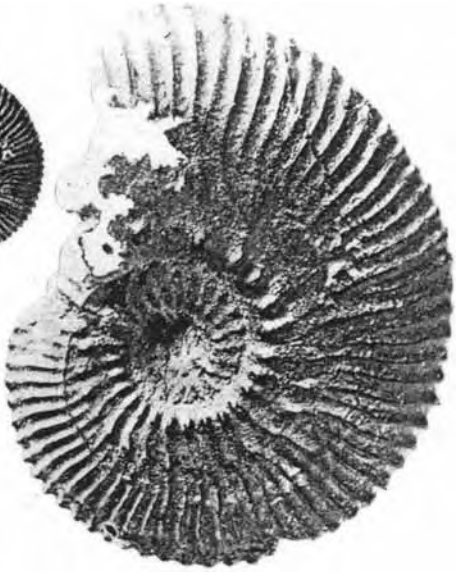


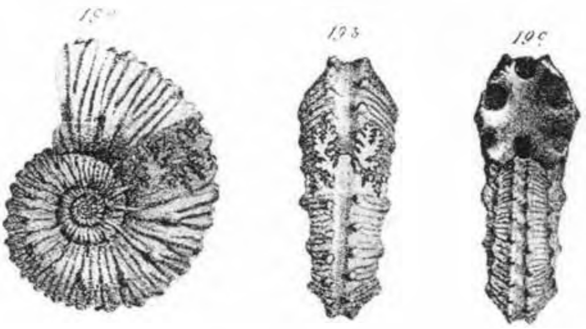
Fig. 1a

Fig. 2

AMMONITES JASON, REINECKE, 1818, Chorotype
Maris prot. 62; III, 15-17; "*Ammonites jason*. Gammelshaüsen"
"Württemberg, Callovien"; Alte Akademie, Munich, Coll.
S. 12·5, 44, 33, 30; 24, 44, 26, 29. Venter, nodes opposite, feebly jugate
Lateral area, outer nodes failing, then lost

GULIELMITES JASON, REINECKE SP.
Kosmoceratan, *conlaxatum*. See CDXVIII

Fig. 1 Fig. 3 Fig. 2



Copy of Photograph

AMMONITES ORNATUS ROTUNDUS, QUENSTEDT, 1846, Holotype
Ceph. 133; IX, 19; "Jungingen, (Hechingen); Brauner Jura ζ"
F. 18, 34, 36, 33; 25·5, 39, 36, 35; 37·5, 40, 37, 35
Venter, nodes alternate; EL, short, L1, broad. Cf. CDLXXXVII

KOSMOCERAS ROTUNDUM, QUENSTEDT SP.
Kosmoceratan, *duncani*; Genolectotype, T.A. III, 53

Fig. 1

Fig. 2

" AMMONITES WATERHOUSII "
" Minchinhampton, [Glos.] ; Great Oolite" ; Sedgwick Mus., Cambridge
Matrix cream coloured, shelly, much oolitic
S. 29, 49, 21, 17·2 ; 62, 55, 19·5, 11·8

OXYCERITES ASPIDOIDES, OPPEL SP. 1857
Oxyceritan, *aspidoides*. See CDLXXVI & Vol. V, 27

Fig. 1 Fig. 2

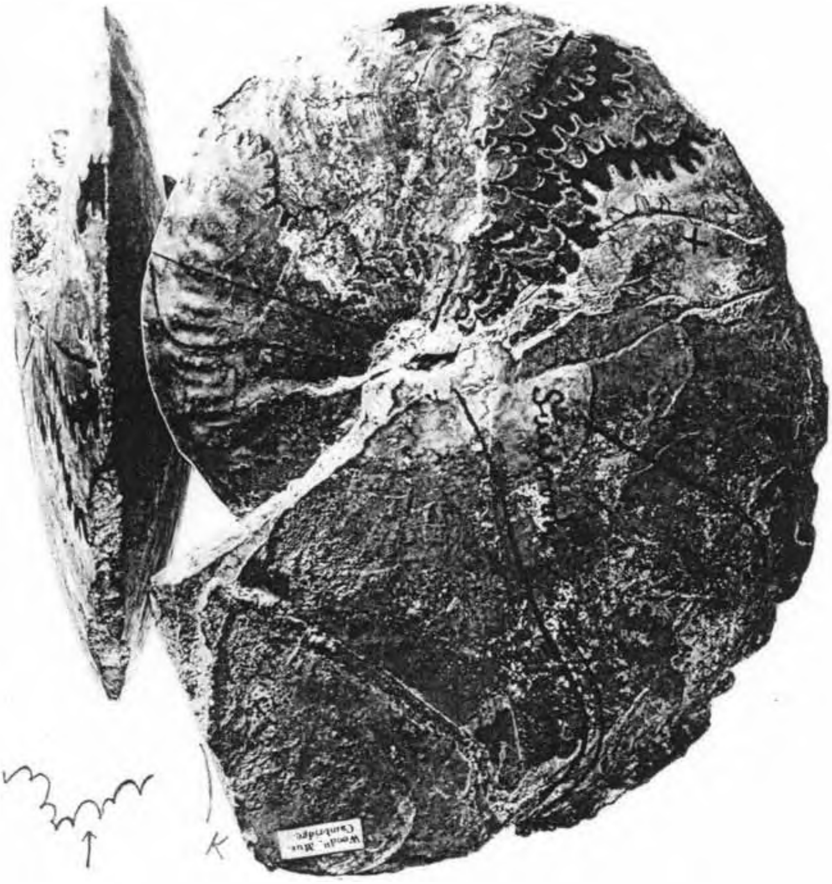


Fig. 3
L1 worn
other side

CLYDONICERAS DISCUS; BLAKE, 1905, Genotype
Mon. Cornbr. 54; VI, 1; "Sudbrook, [Lincs]; [Low.] Cornbr."
Matrix, bluish argill., shelly stone; Sedgwick Mus., Cambridge
S. 66, 60, 22, 0?; 107, 60, 24, D; size c. 113; max. c. 125

CLYDONICERAS DISCUS, J. SOWERBY SP. 1812
Clydoniceratan, *discus*. Cf. D & Vol. V, 29

"Ammonites koenigi"
"Chippenham, Wiltshire; Kellaways Rock" [near top]
Light yellowish sandstone, decomposed; Geol. Surv. Engl. 26082
S. 38, 45, 26, 28; 50, 42, 24, 28; 76, 41, 24? [20], 34·5; max. c. 80

PROPLANULITES FRACIDUS, S. Buckman, 1921, III, 40
Proplanulitan, *fracidus*; Holotype. See CCCLXXIX

× 2·0

Fig. 1

Fig. 2

AMMONITES SCARBURGENSIS, YOUNG & BIRD, 1828, Holotype
Geol. Yorks., p. 265 ; " Scarborough, Yorkshire ; Second Shale "
" *Am. volutus, spinatum* z., Hawsker," lab. Whitby Mus. 232
S. 14, 46, 25, 28 ; 29·5, 44, 27, 29 ; ribs (1) 24, (2) 46

SCARBURGICERAS SCARBURGENSE, YOUNG & BIRD SP.
Vertumniceratan, *renggeri ?* Cf. CLIV

MORPHOCERAS DEFRANCII; S. BUCKMAN, 1910, cit. spec.
Q.J.G.S., LXVI, 73, § II, 3; "Burton Bradstock, Dorset; I.O."
[*Truellei* Bed (3rd Bed)]; S.B., ex Darell, Coll. 4118
S. 18·5, 39·5, 48, 37; 32, 31, 30, 43; c. 38 ribs

DIMORPHINITES DEFRANCII, D'ORBIGNY SP. 1846
Parkinsonian, *truellei*. See CCCLXXVII

× 0·33

Ammonites plicatilis
" Horspath Quarry, W. of Horspath, Oxon " ; Lower Calc. Grit
[Hard Bed above Littlemore Sands = Shell Bed + ?]
S.B. Coll. 29341 purch. Mouth preserved. EL = Li < N

ARISPHINCTES ARIPREPES, nov.
Perisphinctean, *martelli* ; Genotype, Holotype. Cf. CCLXXXII

Fig. 1 N.S.

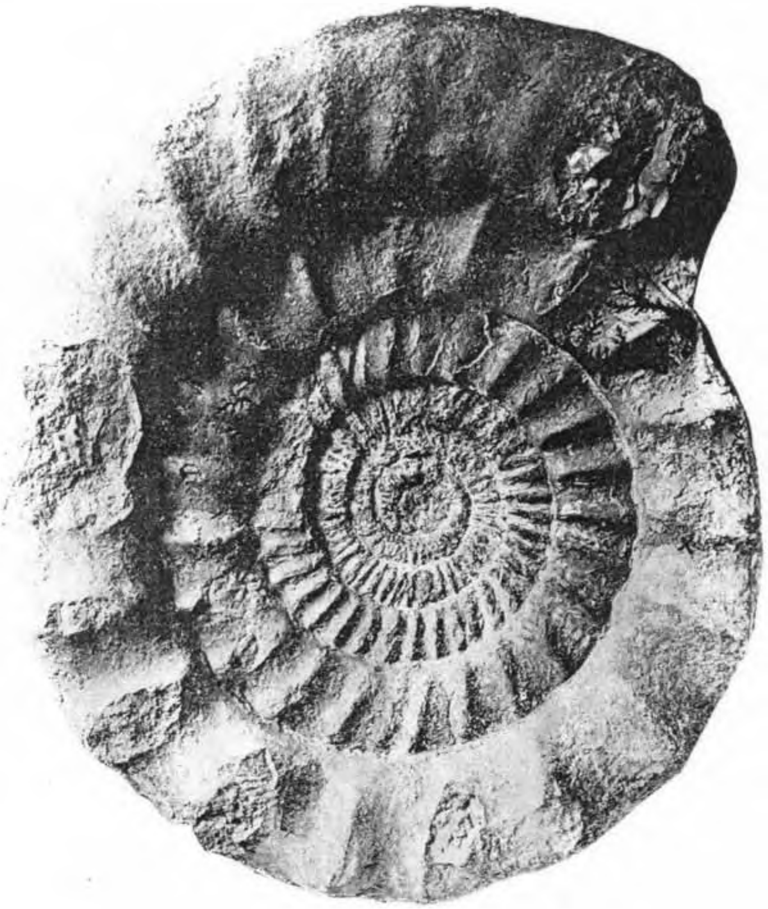
Fig. 2
× 0·33

AMMONITES PLICATILIS
Cf. *Perisph. paraudieri,* Loriol, 1903, 90, VIII, (non VII, type)
S.B. Coll. 2934; EL, 64 of 70; L1, 70, L2, 30, Aux., 36 of 67 mm.
S. 160, 49 ribs; 270, 26, 26, 55; 46 ribs; 417, 24, 23, 59; 36 ribs
Ribs 1 to 3, 4; large ribs single; venter flattened

ARISPHINCTES ARIPREPES, NOV.
Perisphinctean, *martelli*; Genotype, Holotype. Cf. CCLXXXII

× 0·23

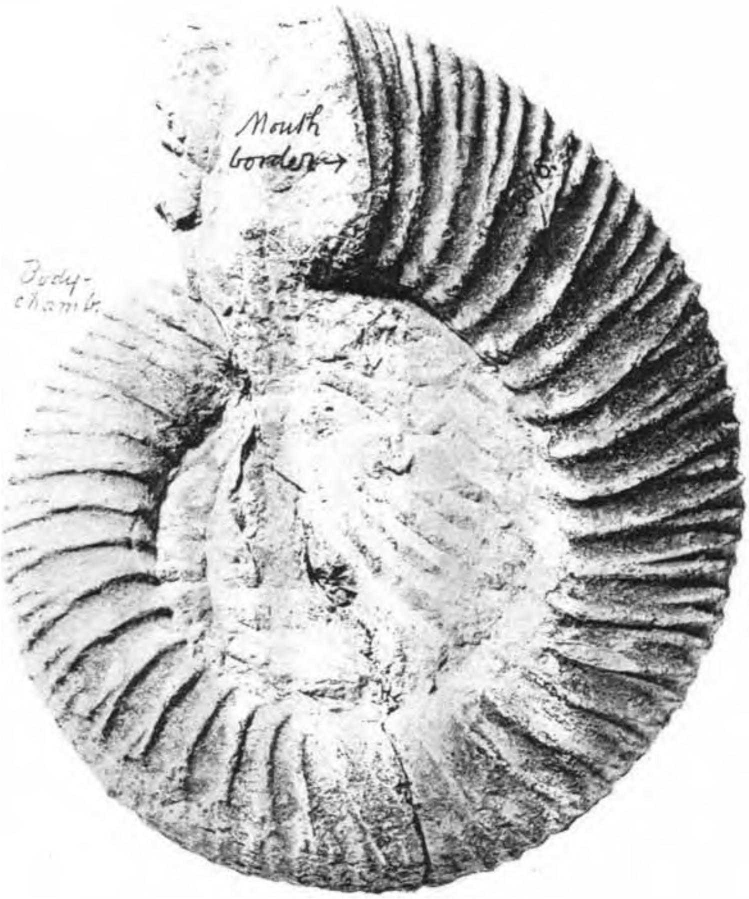
Trigonia



AMMONITES MAXIMUS, YOUNG & BIRD, 1828, Holotype
Geol. Yorks., p. 255, "[Pickering], Yorkshire; Oolite," [*Trigonia* Bed]
Clav. *Trig.* in matrix; Whitby Mus. 1281; S. 225, 35 ribs
S. 338, 20, 21, 62; 22 ribs; 512, 21, 22, 61; 20 ribs
L1, 73, L2, 28·5, Aux. 1, 35 of 69 mm. Mouth preserved

ARISPHINCTES MAXIMUS, YOUNG & BIRD SP.
Perisphinctean, *martelli*. See DXI

× 0·3



AMMONITES GIGANTEUS
" Barrel Hill, Long Crendon, Bucks ; Portl., Creamy Limestones;"
[Lower Witchett], white, chalky ; S.B. Coll. 3878, purch.
S. 319, 30, 35, 49 ; 380, 31, 33, 50 ; c. 38 ribs ; Mouth preserved

PLEUROMEGALITES FORTICOSTA, NOV.
Gigantitan, *fasciger* ; Genotype, Holotype. Cf. CCCXLIII

× 0·2

AMMONITES GIGANTEUS
"Barrel Hill, Long Crendon, Bucks; Portl., Osses Ed."
Brown stone; S.B. Coll. 3300, purch.; S. 360, 31, 37, 48; 39 ribs
S. 449, 32, 34, 46; 571, 32, 34, 45; 58 ribs; max. c. 585

HIPPOSTRATITES RHEDARIUS, nov.
Gigantitan, *hippocephaliticus*; Holotype. See CDXCV

TYPE AMMONITES—V

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

PART XLVIII
Pages 29-44; 11 Plates; 1 Reprint (CDXL*)

PUBLISHED BY THE AUTHOR

SOLD BY

WHELDON & WESLEY, LTD.
2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET
LONDON, W.C. 2

October, 1924

CONTENTS

PART XLVIII

Fig. 1 ×0·89 Fig. 2

LYTOCERAS CORNUCOPIÆ ; S. BUCKMAN, 1896, cit. spec.
Geol. Mag., (4) III, 421 ; South Petherton, Somerset
Upper Lias, clay beds ; S.B. Coll. 1032
S. 60, 41·5, 36, 34 ; 168, 44, 32, 30 : max. c. 270 +

LOBOLYTOCERAS PERLOBULATUM, nov.
Hildoceratan, c. *bifrons* ; Genotype, Holotype. Cf. CCCXCI

AMMONITES HUMPHRIESIANUS ; J. BUCKMAN, 1858, cit. spec. ?
Q.J.G.S., XIV, 105, 122 ; "Fairford, Glos ; [Upper] Cornbrash"
Matrix, yellowish-brown, sandy ; Univ. C., Nottingham (ex R.A.C.)
S. 82, 34, 24, 41 ; 40 ribs ; 134, 27·5, 21·5, 48·5 ; 40 ribs ; max. c. 140

HOMŒOPLANULITES STABILIS, NOV.
Macrocephalitan, *Homœoplanulites* ; Holotype. See CCCXXVIII

Fig. 1

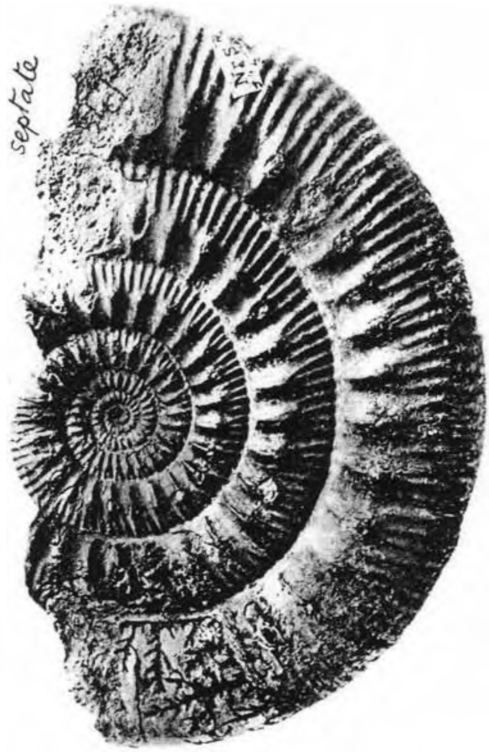


Fig. 2

AMMONITES HUMPHRIESIANUS; J. BUCKMAN, 1874, cit. spec.
Proc. Som. Arch. N.H., XX, 148; " [Sandford Lane], Sherborne, Dorset"
[Foss. Bed, upper part]; S.B., ex Darell, Coll. 3472
S. 42, 26, 28·5, 48; 98; 20, 22·5, 59·5; wholly septate

SKIRROCERAS LEPTOGYRALE, NOV.
Sonninian, *sauzei*; Holotype. See CCXLVIII

×0·44

SHIRBUIRNIA TRIGONALIS, S. BUCKMAN, 1910. Holotype
Q.J.G.S., LXVI, 92; Sandford Lane Qy., Sherborne, Dorset
[Fossil Bed, bottom part]; Manchester Mus. (S.S.B. Coll.) L 11405
S. 166, 44·5, 34, 30; 325, 35, 30, 36·5; max. c. 328

SHIRBUIRNIA TRIGONALIS, S. BUCKMAN
Sonninian, *Shirbuirnia*. See CDLX

Fig. 2a

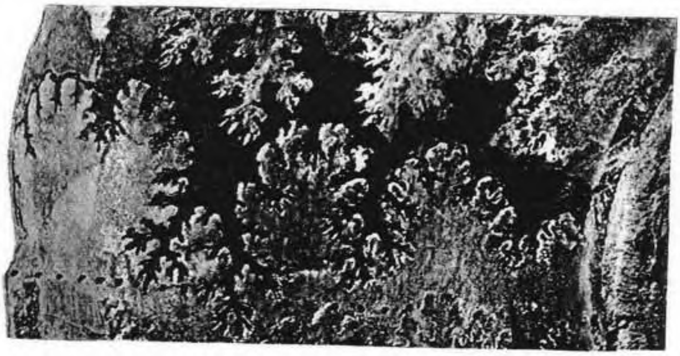


Fig. 2b

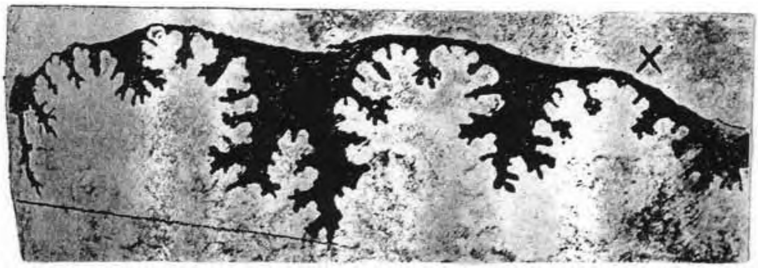
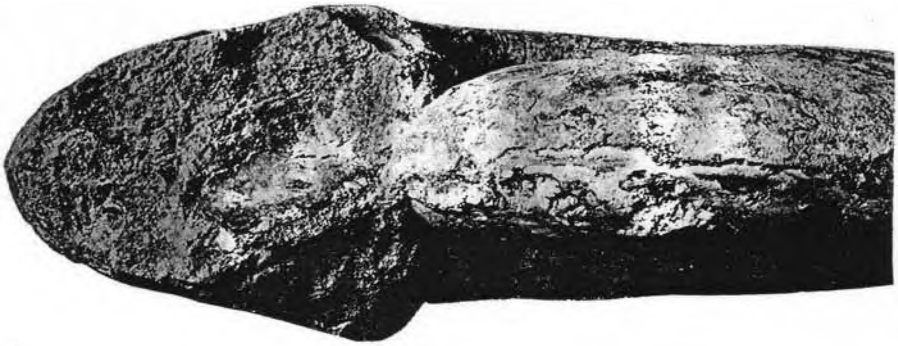


Fig. 1
×0·44



SHIRBUIRNIA TRIGONALIS, S. BUCKMAN, 1910, Holotype
Q.J.G.S., LXVI, 92 ; Sandford Lane Qy., Sherborne, Dorset
Two suture-lines taken at 76 and 97 mm. whorl breadth
Illustrating the phenomenon of septal degeneration in the same specimen

SHIRBUIRNIA TRIGONALIS, S. BUCKMAN
Sonninian, *Shirbuirnia.* See CDLX

Fig. 1

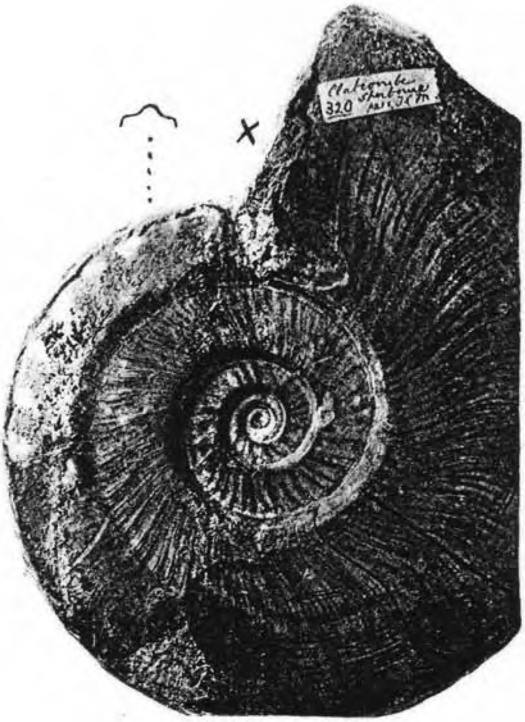
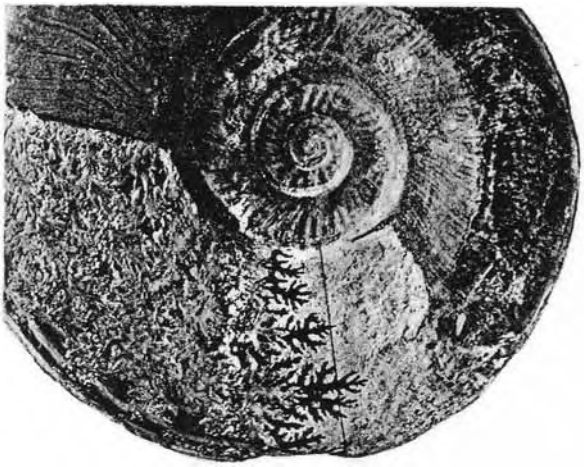


Fig 2

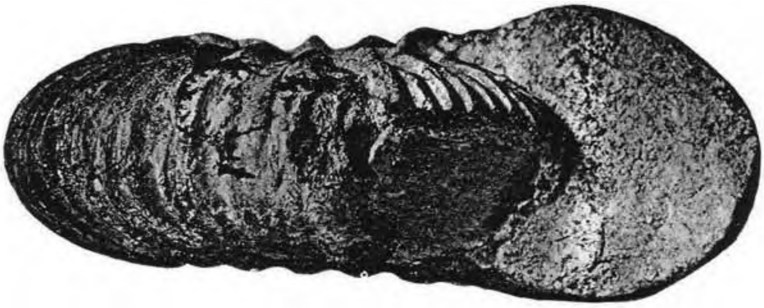


LUDWIGIA ROMANOIDES
Sonninia rom.; "Clatcombe [Sandford Lane], Sherborne, Dorset "I.O.," [Foss. Bed, Up. pt]; S.B. Coll. 320, pres. T. C. Maggs, F.G.S.
S. 54·5, 39, 19, 26·5; 97, 39, 19·5, 31; max. c. 130
Sl. diff. *L. rom.*; car. & ventr. proj. stronger; longit. lineation

HYALINITES HYALINUS, NOV.
Sonninian, *sauzei*; Genotype, Holotype. Cf. CDX

Fig. 1

Fig. 2



OLCOSTEPHANUS TRIPLICATUS
[Chicksgrove, Tisbury, Wilts; Portl., Bed 13, Miss Benett's section, J. Sowerby, Min. Conch. II, 1816, 59]; feebly glauconitic; J.W.T. Coll.
S. 70, 36, 39, 39; 105, 33, 41, 40; ribs 21, c. 64; max. c. 130

KERBERITES KERBERUS, NOV.
Behemothan [7], *kerberus*; Genotype, Holotype. Cf. CCCLV

Fig. 1 N.S.

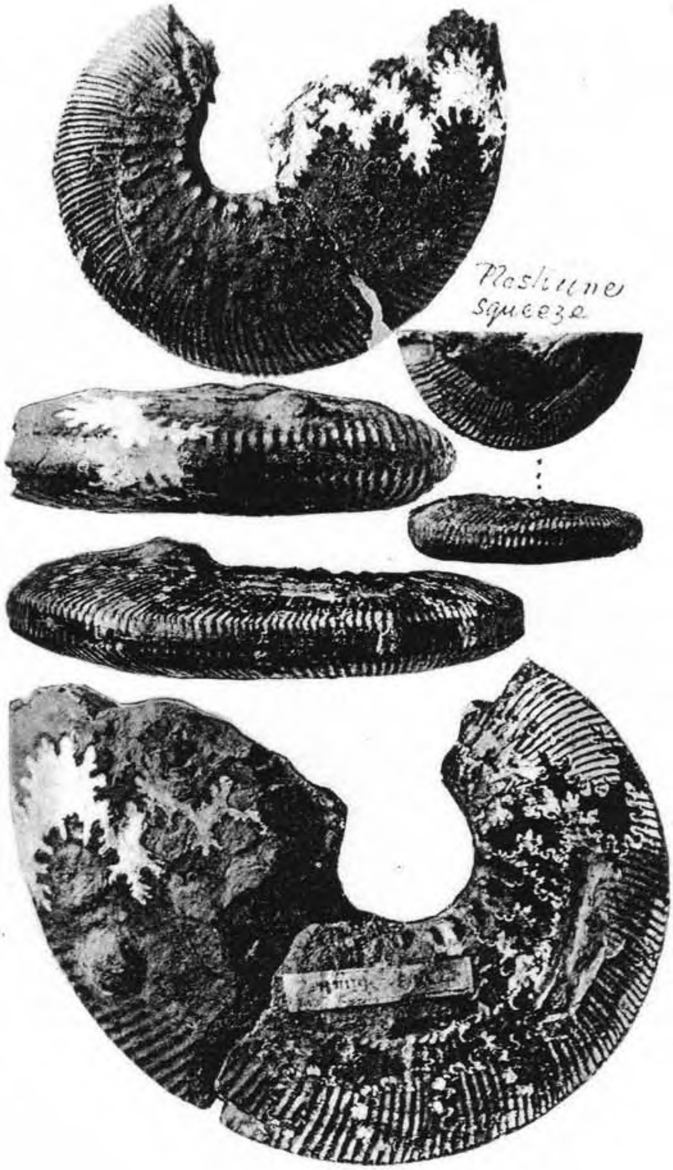


Fig. 1b

Fig. 2a

Fig. 2b

Fig. 2

Fig. 1a

× 1·4

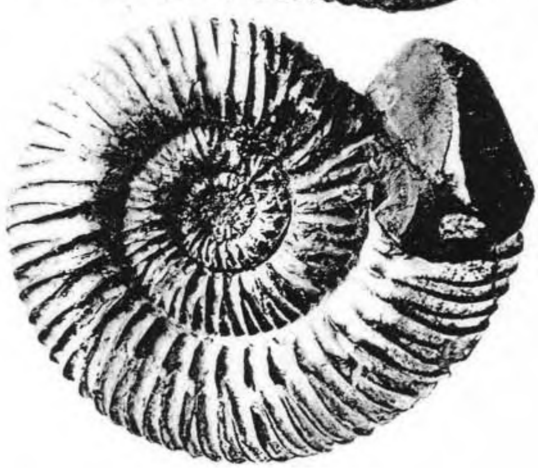
" AMMONITES JASON "
" Gammelshausen, Württemberg ; Callovien" ; Alte Akad., Munich, Coll.
S. 34, 44, 26, 28 ; 66, 44, 19, 22 ; max. c 90+
Lat., outer nodes lost ; venter, nearly smooth band, nodes small, crowded

GULIELMITES DELICATUS, nov.
Kosmoceratan, *conlaxatum* ; Holotype. See DIII

Fig. 1

Fig. 2

Fig. 1a



REINECKEIA STUEBELI
"Greenhill, [Backwater ?], Weymouth, Dorset ; Oxford Clay"
Blackish stone, cf. matrix CDXVIII ; Dorset County Museum
S. 40, 32, 35, 42 ; 67, 30, 25, 47·5 ; ribs 34 ; max. 69 ; EL incomplete

REINECKEITES DUPLEX, NOV.
Reineckeian, *rehmanni* ; Genotype, Holotype. See p. 33

AMMONITES SUBRADIATUS; J. BUCKMAN, 1858, cit. spec. ?
Q.J.G.S., XIV, pp. 104, 122; "Fairford, Glos.; Cornbrash"
[Upper? Cornbrash], bluish-buff, marly; S.B., ex J. B., Coll. 2001
S. 49, 57, 26, —; 83, 59, 23, 3·6; max. c. 85. See p. 29

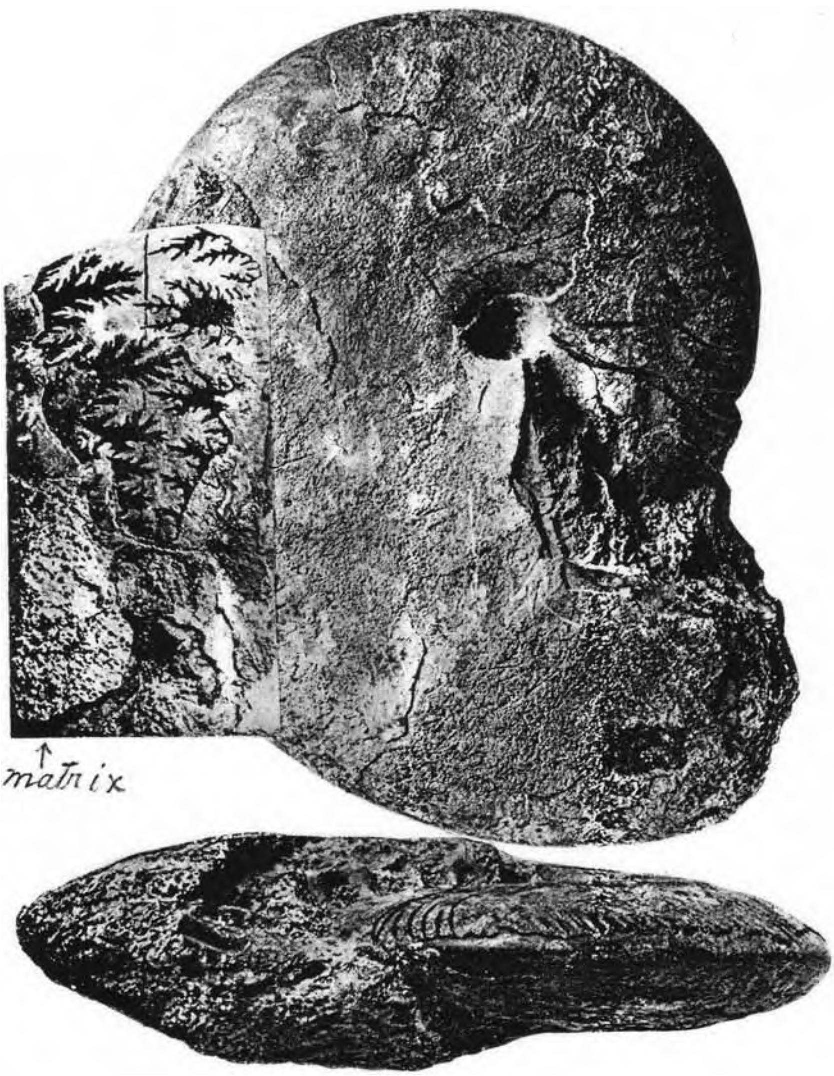
BENEDICTITES HOCHSTETTERI, OPPEL SP. 1857
Macrocephalitan, *dolius*; Genotype, Holotype. Cf. DVI

Fig. 1

Fig. 3

Fig. 4

Fig. 2



OPPELIA SUBRADIATA; WAAGEN, 1869, Fig. Spec.
'*Am. subradiatus*'; Geogn.-Pal. Beitr., II (2), 193; XVI, 1
"St. Vigors bei Bayeux, Normandie; z. des *A. humphriesianus*?"
Brown limonitic grains in a light matrix; Alte Akad., Munich
S. 58, 51, 32, 15·5?; 117, 59, 28, 5·6; max. c. 175

OPPELIA WAAGENI, S. BUCKMAN, 1920, III, p. 25
Stepheoceratan, *Epalxites*; Genolectot., Holot. Cf. CCCIII

(voir fiche suivante)

Fig. 1

Fig. 3

Fig. 4

Fig. 2

OPPELIA SUBRADIATA ; WAAGEN, 1869, Fig. Spec.
'*Am. subradiatus*' ; Geogn.-Pal. Beitr., II (2), 193 ; XVI, 1
" St. Vigors bei Bayeux, Normandie ; z. des *A. humphriesianus ?* "
Brown limonitic grains in a light matrix ; Alte Akad., Munich
[*Oppelia waageni*, S.B. 1920, non Zittel, 1870 (Dr. Spath)]

OPPELIA LECTOTYPA, NOV.
Stepheoceratan, *Epalxites* ; Genolectot., Holot. Cf. CCCIII

CONTENTS

Part XLIX

CHELTENHAM
NORMAN, SAWYER AND CO., LTD., PRINTERS
ST. GEORGE'S HALL

AMMONITES BONONIENSIS
Thame, Oxon (Chinnor Road, near Police Sta., temp. excavation
Just above Thame Sands, [Blue Bed), glauc., few lydites
S.B. 3940; S. 182, 29.5, 37, 42; 226, 30, 31, 46; size c. 255; max. c. 275

BEHEMOTH LAPIDEUS, S. BUCKMAN, 1922
Behemothan 2 (not 3 ?), *megasthenes*. See CCCV

Fig. 1

Fig. 2

Fig. 4

Fig. 3

AMMONITES SUBRADIATUS, WAAGEN, 1869, Sut.-line figd.
'*Am. subradiatus*';—Geogn.-Pal. Beitr. II (2), 193
"Sully bei Bayeux, Normandie; zone des *A. humphriesianus?*"
Dark-brown, polished iron grains in brown matrix
Alte Ak., Munich; S. 67, 51, 25, 16?; 108, 56, 22. 13; max. c. 170

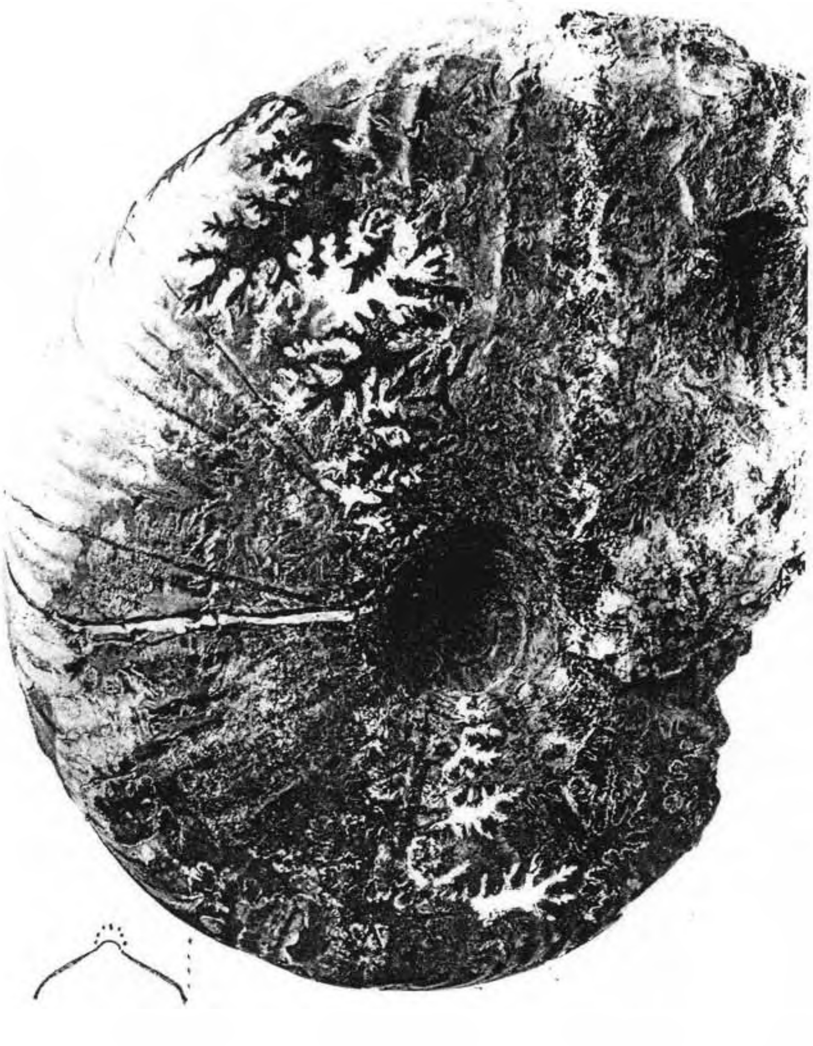
FLEXOXYITES FLEXUS, NOV.
Stepheoceratan, *Leptosphinctes*; Holotype, Genotype. Cf. DXXIV

Fig. 1

Fig. 2

AMMONITES SUBCOSTATUS ; S. BUCKMAN, 1881, cit. spec.
Q.J.G.S., XXXVII, 607 ; "Frogden Qy., Oborne, Dorset ; *Humphr.* z."
(Cf. Id. XLIX, 1893, 500, § XV, 4) ; S.B. Coll. 4126
S. 35, 41, 29, 24·5 ; 68·5, 52, 27, 16
⤚ Last s.l. beginning to be formed at posterior points of its lobes

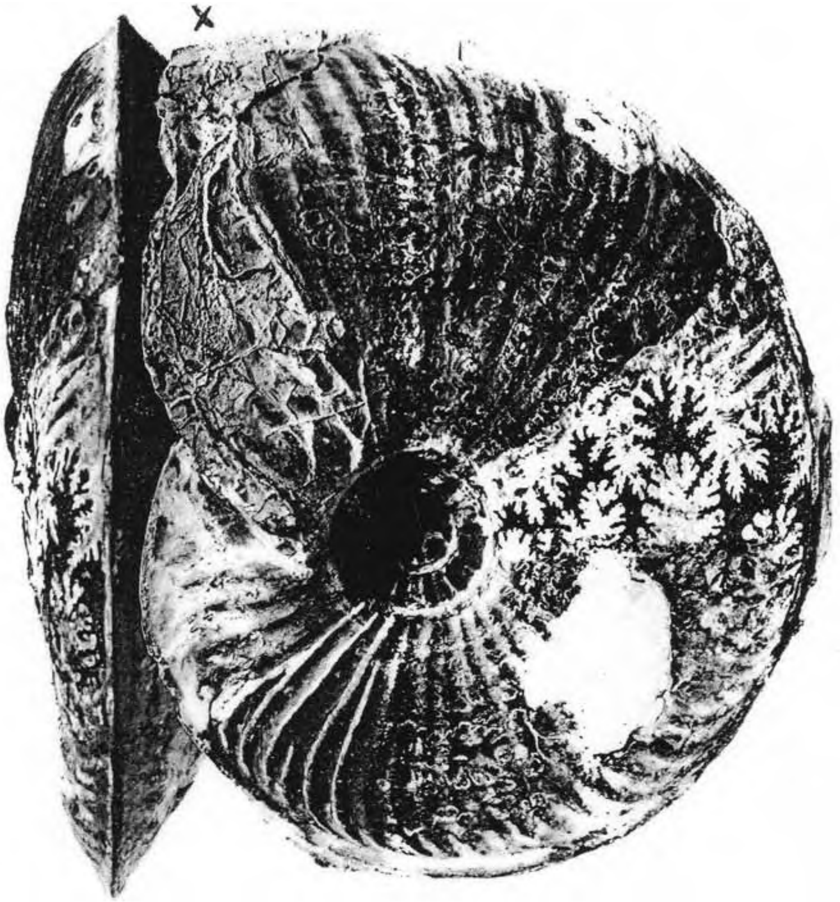
FLEXOXYITES FLEXUS, NOV.
Stepheoceratan, *Leptosphinctes* ; Paratype. Cf. DXXIV



AMMONITES GREENHOUGHII ; J. Buckman, 1844, cit. spec.
Geol. Chelt. 89 ; *Gleviceras glevense*, S.B., Q.J.G.S., LXXIII, 1918, 290
" Lansdown, Cheltenham, Glos ; Lias Shales" ; limonitic infilling
S.B., ex J. B., Coll. 1058 ; S. 71, 48, 28, 21 ; 148, 52, 26, 14·5

GLEVICERAS GLEVENSE, S. BUCKMAN SP.
Oxynoticeratan, *glevense* ; Genotype, Paratype. Cf. CXXXVII

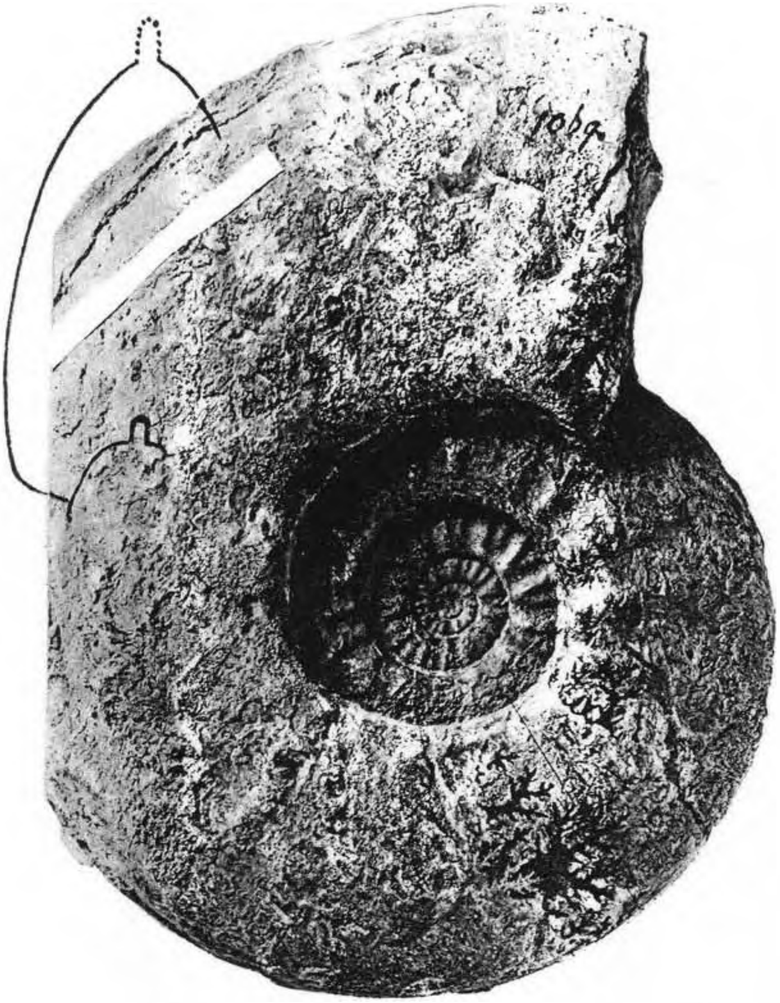
Fig. 2 Fig. 1



AMMONITES GREENHOUGHII; J. BUCKMAN, 1844, cit. spec. Geol. Chelt. 89; (*Oxynoticeras subguibalianum*, Pia, 1914)
"Lansdown, Cheltenham, Glos; Lias Shales"; blue clay, pyritized
University Coll., Nottingham, ex R. A. C., Cirencester, ex J. B. Coll.
S. 72, 44, 21, 25; 121, 49, 18·4, 24; max. c. 180

GLEVUMITES SUBGUIBALIANUS, PIA SP.
Oxynoticeratan, *glevense*; Genotype, Topotype. Cf. DXXVI

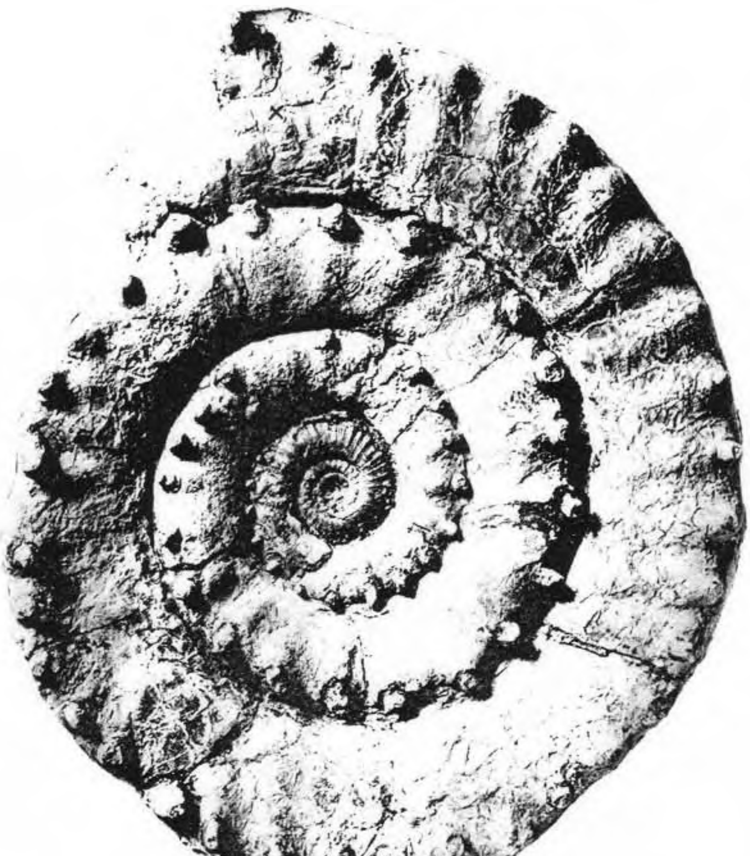
× 0·93



Ammonites variabilis, ; J. Buckman, 1874. cit: spec. ?
Proc. Som. Arch. Soc. xx, 146 ; "[Clatcombe], Sherborne, Dorset"
"I.O." brown ironshot ; S.B., ex Darell. Coll. 1069
S. 70, 41, 27, 33 ; 142, 41, 26, 31 ; max. c. 210 +

SONNINITES ALSATICUS, Haug sp. 1885
Sonninian, *alsatica*. See CDLXI

× 0·27



AMMONITES HAMILTONI, SIMPSON, 1843, Holotype
Mon. Amm. Yorkshire Lias, 27, 28; "Robin Hood's Bay"
"Lowest Beds of Lias; diam. 17 inches; spines ¾ inch", 1843
"Probably about the stratum *t*" [t, but even that too late], 1884

APODEROCERAS HAMILTONI, SIMPSON SP.
Deroceratan, *leckenbyi*. See CCXXXV

N.S.

AMMONITES HAMILTONI, SIMPSON, 1843, Holotype
Leckenbyi-stage, with a few small spines to c. 95 diam.
Penult. whorl 21 spines; ult. whorl with 34
S. 272, 22, c. 15, 55; 430, 22·5, c. 16, 63; max. c. 600

APODEROCERAS HAMILTONI, SIMPSON SP.
Deroceratan, *leckenbyi*. See CCXXXV

AMMONITES STUTCHBURII, PRATT, 1841, Holotype
Ann. Mag. N.H. VIII, 163, 165; IV, 2; "Christian Malford, Wilts"
"Oxf. Clay" [C. M. Clay], "*acutistriatum* matrix" (J. W. T.)
Bristol Museum, c. 1799 [a], Stutchbury Coll.
Φ, 28, 42, —, 25; "S. 58, 36, —, 30," V.E.R.

ANAKOSMOKERAS STUTCHBURII, PRATT SP.
Kosmoceratan, *stutchburn;* Genotype. See CDLXXXVI

AMMONITES STUTCHBURII, PRATT, 1841, Paratype
Ann. Mag. N.H., VIII, 163, 165 ; IV. 3 ; "Christian Malford, Wilts
"Oxf. Cl.," "light blue, matching Kel. Cl. Macrocephaloids" (J.W.T.)
Bristol Museum, C 1799 [b], Stutchbury Coll.
Φ.32, 42, —, 23 ; 52, 42, —, 27 ; size 55 ; max. 57

GULIELMICERAS INTRONODULATUM. NOV.
Proplanulitan [*rudis ?*] ; Holotype. See DXXXI

Fig. 1

Fig. 2

PICTONIA DENSICOSTATA, SALFELD, Chirotype
Cit. Pringle & Kitchin, Mes. Rocks, Kent (M. Geol. S.), 1923, Pl. II
Ringstead Bay, Dorset ; Kimm. Cl. ; Mus. Pract. Geol. 25481
S. 67, 30, 27, 48 ; 108, 30, 22, 49 ; max. c. 185+

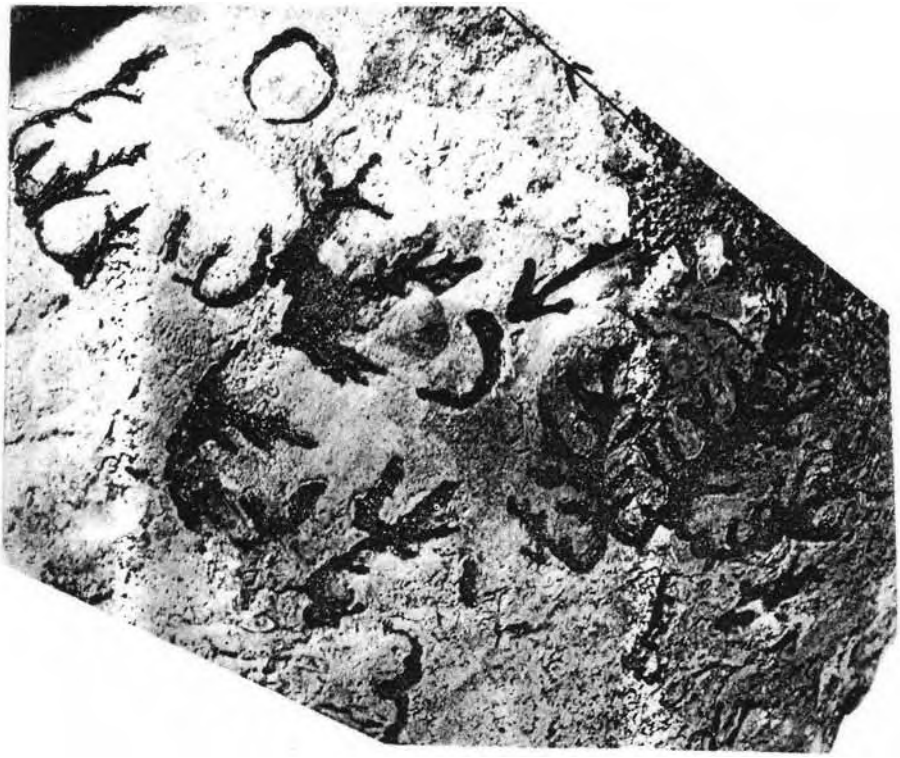
PICTONIA DENSICOSTATA, SALFELD–PRINGLE–KITCHIN
Rasenian [1], *baylei* ; Holotype

× 0·44

AMMONITES GIGANTEUS
Long Crendon, Bucks, (N.W. Pit); Portl. [Waterstone. IV, p. 26, bed 24]
Rather soft, light-coloured matrix, diffused glauconitic
S.B. Coll. 4015, purch.; EL, c. 57, L1, 57, L2, 37 % of 52 mm. w.-b.

AQUISTRATITES AQUATOR, NOV.
Behemothan (1), *aquator*; Genotype, Holotype. Cf. CCCVI

× 3



AMMONITES GIGANTEUS
S.B. Coll. 4015; S. 214, 24, 31, —; 330, 25·5, 23·5, 55
Between L2 and)←⋘, *Orbiculoidea glabella*, nov., Holotype
In O mark of another ex. detached (lost) during handling

AQUISTRATITES AQUATOR, NOV.
Behemothan (1), *aquator*; Genotype, Holotype. Cf. CCCVI

Fig. 1

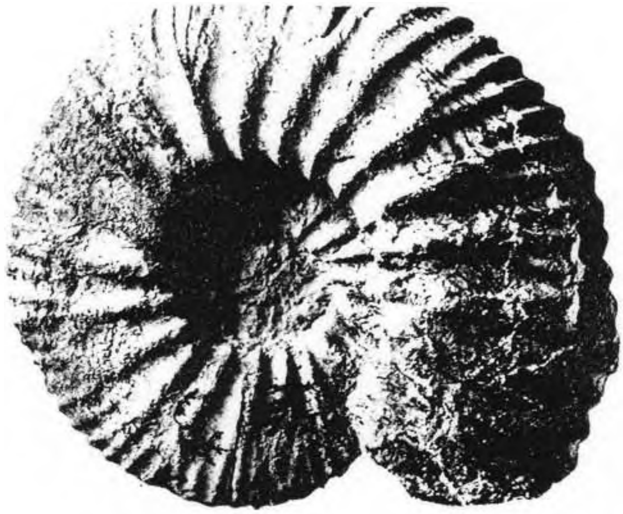


Fig. 2

AMMONITES BIPLEX; J. BUCKMAN, 1858, cit. spec. ?
Q.J.G.S. XIV, 129; [Swindon, Wiltshire; Portl.. Cockly Bed]
Am. triplicatus, Auctt.; Univ. C., Nottingham. ex R.A.C. Coll.
S. 50, 41, c. 34, 30; 82, 37, 38, 36; max. c. 90

KERBERITES TRIKRANUS, NOV.
Behemothan (7), *kerberus*; Holotype. See DXX

× ·50

AMMONITES BONONIENSIS
Long Crendon, Bucks (Barrel Hill); Portl., "Bottom Bed. Hard Brown"
Hard, grey, sandy stone, with ochre flecks; S.B. Coll. 2964, purch.
S. 152, 30. 30. —; 208. 30, 41, 47; size 212; max. 275

VAUMEGALITES VAU, NOV.
Behemothan (15), *vau*; Genotype, Holotype. Cf. DXX

TYPE AMMONITES—V

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

PART XLIX

Pages 41-44 (reprinted), 45-48; 16 Plates

PUBLISHED BY THE AUTHOR

SOLD BY

WHELDON & WESLEY, LTD.

2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET

LONDON, W.C. 2

December, 1924

TYPE AMMONITES—V

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

PART L

Pages 49-56; 20 Plates

PUBLISHED BY THE AUTHOR

SOLD BY

WHELDON & WESLEY, LTD.

2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET

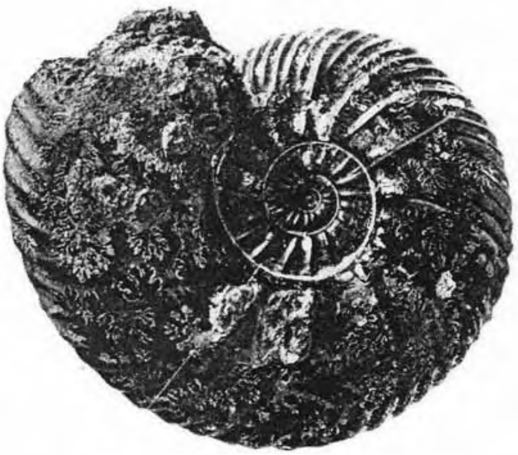
LONDON, W.C. 2

February, 1925

CONTENTS

PART L

CHELTENHAM
NORMAN, SAWYER AND CO., LTD., PRINTERS
ST. GEORGE'S HALL



AMMONITES LAMBERTI
Tidemoor Point, Chickerel, Weymouth, Dorset; Oxf. Clay
Pyritized in clay; form with rather elaborate suture-line
S.B. Coll. 3993; S. 37, 39, 24, 31; 70, 43·5, 25, 31·5; max. c. 100+

BOURKELAMBERTICERAS LAMBERTI, J. SOWERBY SP.
Vertumniceratan, *lamberti*; Topotype

Fig. 1a

Fig. 3d

Fig. 1

Fig. 2

Fig. 3a

Fig. 3c

Ancyloceras calloviensis, Morris, 1845, Syntype
Ann. Mag. N. H. XV, 32; VI, 3a "near Chippenham, [Wilts"
"Kelloway Rock"; "Kelloway, Wilts," C. Pearce lab.; brown grit
Bristol Mus. Ca. 7353, Chaning Pearce Coll.; (3d, Pratt Coll. ?)

PARAPATOCERAS CALLOVIENSE, Morris sp.
Proplanulitan, *opimus*; Genotype, Lectotype. See V, 33. Cf. CDXCII

Fig. A, 1a
× c. 5

Fig. 3b

Fig. A, 11-13

Fig. A, 1
Fig. A, 2-10

ANCYLOCERAS CALLOVIENSIS, MORRIS, 1845, Syntype (1)
Fig. 3b, Protograph (copy); A, Slab with over 12 specs. one side
A, 1, Morris's fig. spec., now holotype gen. & sp. n.; 2–10 Paratypes
A, 11-13, sp. or spp. nov.; Bristol M., Ca., 5219, Chaning Pearce Coll.

CRIOCONITES CRIOCONUS, NOV.
Proplanulitan, *crioconus*; Genotype, Holotype. Cf. DXXXVII

× 1·23

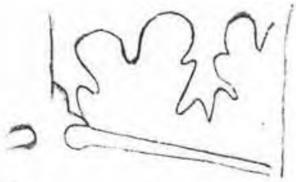
Fig. A

Fig. B

ANCYLOCERAS CALLOVIENSIS, MORRIS, 1845, Syntype
Ann. Mag. N. H., XV, 32; VI, 3b; "near Chippenham, [Wilts]"
"Cocklebury Hill" (Museum label); "Kelloway Rock";
Bluish sandy grit, *Ancyl.* Bed betw. Kell. Clay and Kell. R.

CRIOCONITES CRIOCONUS, NOV.
Proplanulitan, *crioconus*; Genotype, Holotype. Cf. DXXXVII

Fig. 2 × 3·8



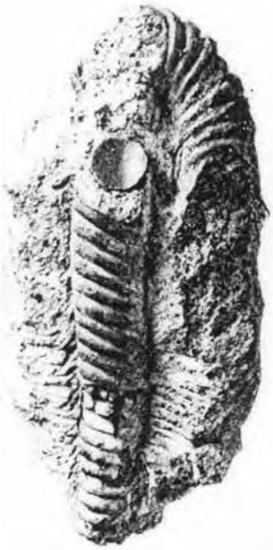
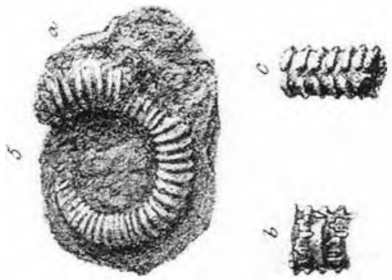


Fig. 1
× 1·27

Fig. 4a Fig. 4b

ANCYLOCERAS COSTATUS, MORRIS, 1845, Holotype
Ann. Mag. N.H. XV, 33; VI, 4a, b. "Bridport, [Dorset],"
"Quarry on a hill on the Weymouth road 2 miles from," (orig. lab.)
[Top of hill above Walditch; Shell Bed]; in b.-ch., ironshot matrix
Bristol Mus., Ca. 7354, Chaning Pearce Coll.

PLAGIAMITES COSTATUS, MORRIS SP.
Parkinsonian, *garantiana*; Genotype. Cf. CDXCII



ANCYLOCERAS WALTONI, MORRIS, 1845. Holotype
Ann. Mag. N.H., XV, 33 ; VI, 5 a–c. " Near Bridport, [Dorset]"
" Inferior Oolite [Shell Bed] ; Walton Coll." ; Protograph (copy)

SPIROCERAS WALTONI, MORRIS SP.
Parkinsonian, *garantiana*. See CDXCII

Fig. 2

Fig. 1

× 0·33

DEROCERAS, giant, S. BUCKMAN, 1918, cit. spec.
Q.J.G.S., LXXIII, 305; "*Deroceras armatum*, Radstock Grove."
"Radstock, Somerset, *armatum*, in situ;" J.W.T. Coll.
"S. 240, 23·5, 27·5 (33·5), 59; 380, 21, 22·5 (26·5), 62"; max. c. 500

APODEROCERAS FEROX, NOV.
Deroceratan, *leckenbyi*; Holotype. See DXXX

× 0·33

DEROCERAS, giant, S. BUCKMAN, 1918, cit. spec.
Q.J.G.S., LXXIII, 305; "Kilmersdon Colliery [= Radstock Grove]
"Radstock, Somerset; *armatum* (*leckenbyi*) bed"
Φ. 250, 26, 33, 50; 363, 23, 33, 58; max. c. 365

APODEROCERAS TARDARMATUM, NOV.
Deroceratan, *leckenbyi*; Holotype. See DXLI

Fig. 2 Fig. 1

× 0·33

Deroceras tardarmatum, S.B., MS.
Deroceras sp., S.B., 1918, cit. spec.; "Kilmersdon Colliery" "Radstock, Somerset"; Mus. Pract. Geol. (S. B. Coll.)
Inner whorls showing a spinous to costate to renewed spinous stage

APODEROCERAS TARDARMATUM, nov.
Deroceratan, *leckenbyi*; Holotype. See DXLI

× 0·94

AMMONITES DESLONGCHAMPSI
Frogden Quarry, Oborne, Dorset ; Inf. Ool., Roadstone
[S.B., Q.J.G.S., XLIX, 1893, 500, § xv, 4] ; S.B. Coll. 3928
S. 94, 34, 65, 40 ; 143, 26, 37, 48 ; max. 143

CADOMITES HOMALOGASTER, nov.
Stepheoceratan, *Leptosphinctes* ; Holotype. See CDXXXII

Fig. 2

Fig. 1

AMMONITES DESLONGCHAMPSI
Frogden Quarry, Oborne, Dorset ; Inferior Oolite
Roadstone, upper part ; *Niortensis*-zone of 1893
Rapid change from cadicone to serpenticone. Cf. CLXIV

CADOMITES HOMALOGASTER, NOV.
Stepheoceratan, *Leptosphinctes* ; Holotype. See CDXXXII

Fig. 1 Fig. 2

AMMONITES DESLONGCHAMPSI
Frogden Quarry, Oborne, Dorset; Inferior Oolite
Roadstone, upper part; *Niortensis*-zone of 1893
Rapid change from cadicone to serpenticone. Cf. CLXIV

CADOMITES HOMALOGASTER, NOV.
Stepheoceratan, *Leptosphinctes*; Holotype. See CDXXXII

Fig. 1 Fig. 2

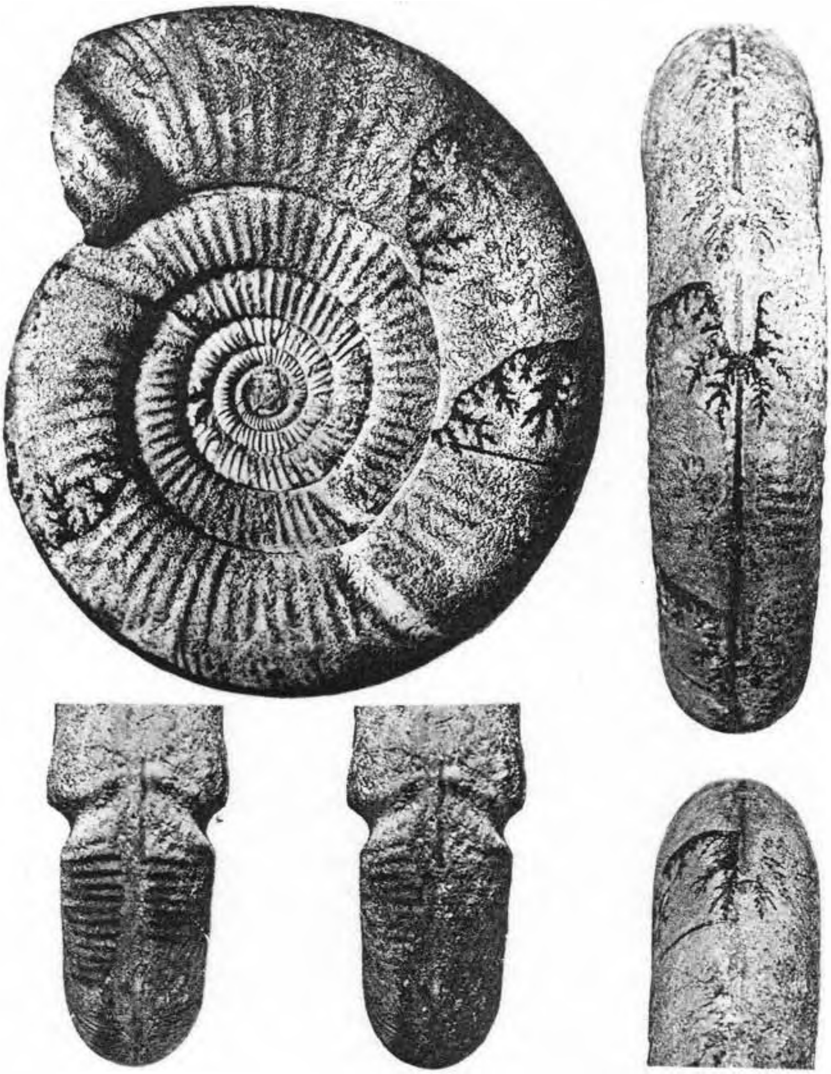


Fig. 2b Fig. 2c Fig. 2a

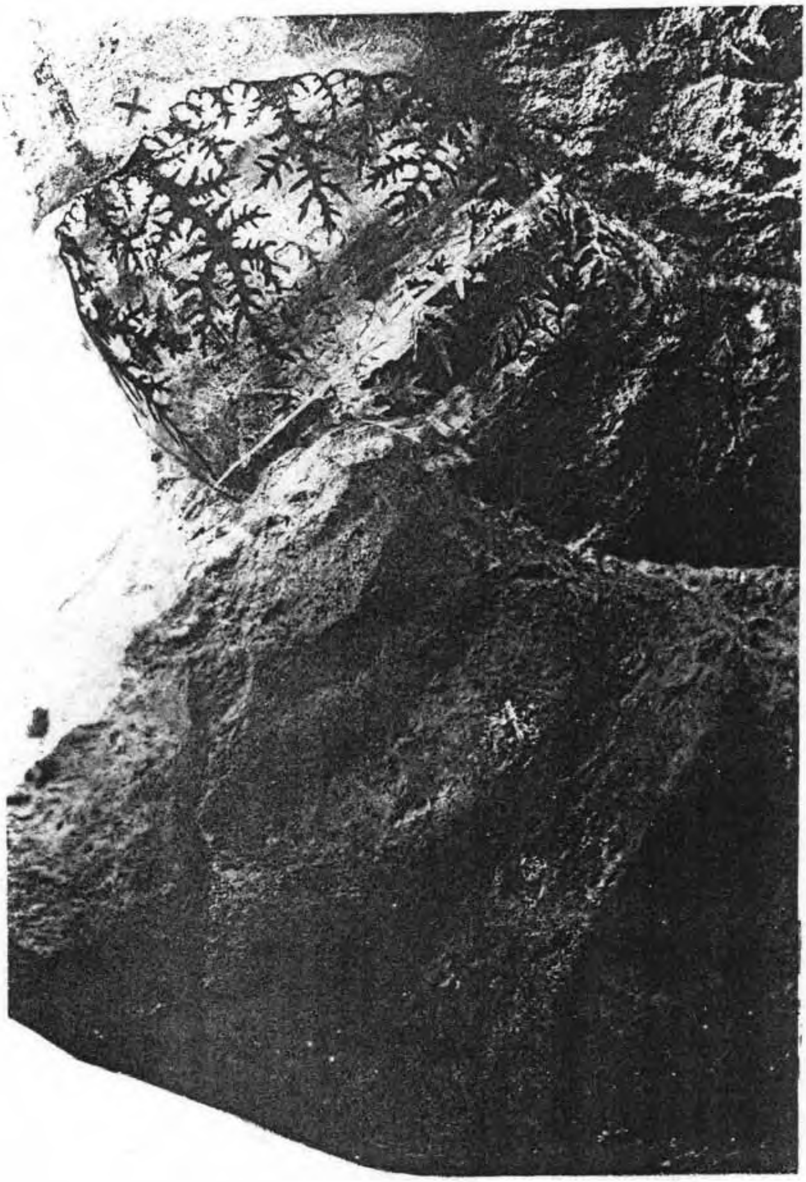
AMMONITES MARTINSI
[Doulting, Somerset ; Inf. Ool., Ragstone]
[(L. Richardson, Q.J.G.S., LXIII, 1907, 396. Bed III, c)] ; J.W.T. Coll.
"S. 58, 28, 26, 52 ; 92, 26, 25, 52" ; EL=N > L1

GLYPHOSPHINCTES GLYPHUS, NOV.
Parkinsonian, *Vermisphinctes* ; Genotype, Holotype. Cf. CCCLXVI

× 0·47

Perisphinctes atlas
Burton Bradstock, Dorset; Inf. Ool., Limonitic Bed
[Occasional bed between Shell Bed and 3rd Bed]
At Vetney Cross, Perisphinctoids in upper part of Shell Bed

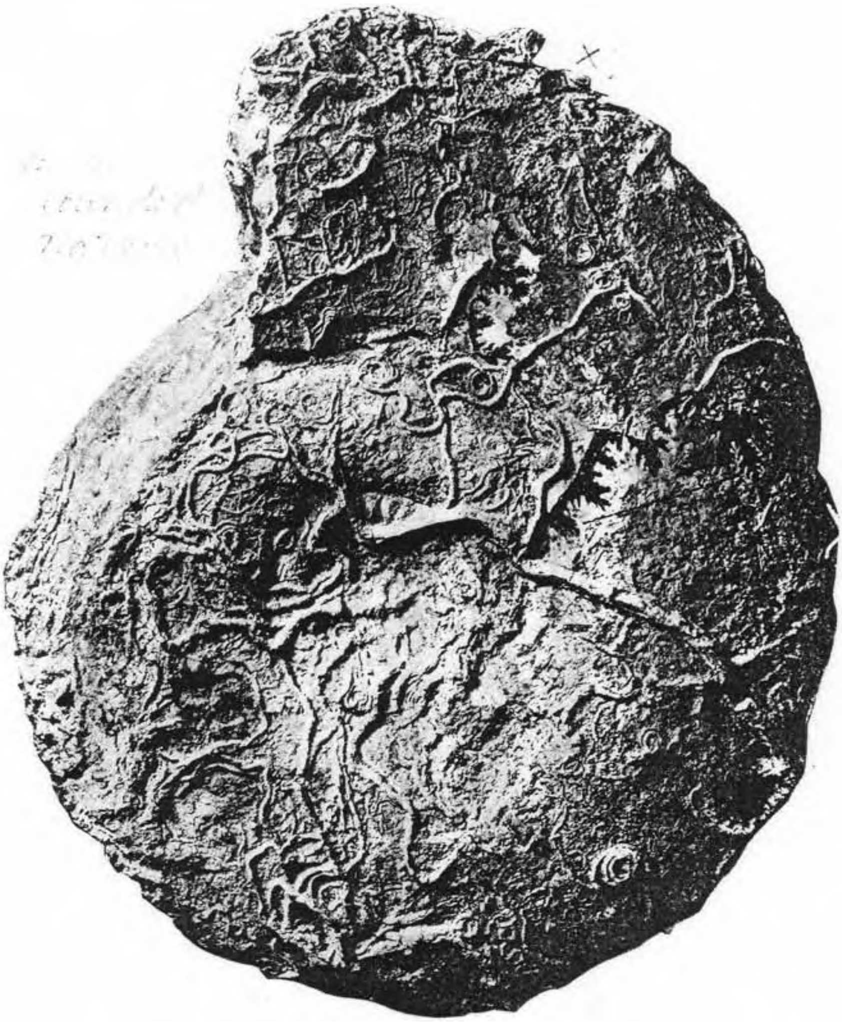
GLYPHOSPHINCTES LIMONITICUS, nov.
Parkinsonian, *Vermisphinctes*; Holotype. See DXLIV



PERISPHINCTES ATLAS
Burton Bradstock, Dorset, [Allotments Quarry]
S.B. Coll. 3395, purch. from workmen ; EL = N > L1
S. 192, 30, 28, 45 ; 303, 28, 25, 49 ; max. c. 305

GLYPHOSPHINCTES LIMONITICUS, nov.
Parkinsonian, *Vermisphinctes* ; Holotype. See DXLIV

× 0·47

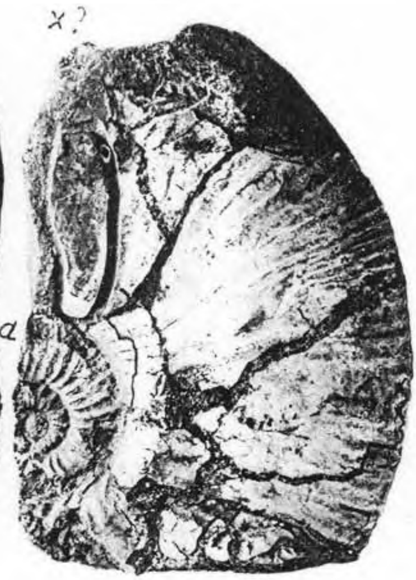


Ammonites parkinsoni laevis
Burton Bradstock, Dorset ; Inf. O., [Scroff] ; S.B. Coll. 3422, purch.
[Dep. in calc. matrix, test removed, cast covered with *Serpula*
Redep. in calc., excavated and redep. in F. E. clay]
S. 148, 43, 30, 34 ; 278, 36, 20, 36 ; max. c. 420

GONOLKITES VERMICULARIS, nov.
Zigzagiceratan, *vermicularis* ; Holotype. See DXLVI

Fig. 2

Fig. 1



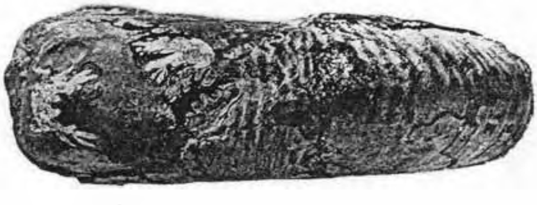


Fig. 3

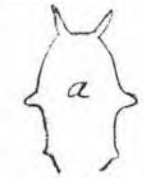


Fig. 4

Cosmoceras cf. duncani var.; Lahusen
(Rjasan, 1883, VII, 10); "Loch Staffin, Isle of Skye, Scotland"
"Oxford Clay," red nodule; Mus. Pract. Geol. 30540
S. 39, 49, 31, 23; 97, 45, 25, 25; max. c. 150
Inner whorls show a kind of *pollux*-stage

KATAKOSMOKERAS DEGRADATUM, nov.
Kosmoceratan, c. *hoplistes*? Genotype, Holotype. Cf. CDXXXVI

AMMONITES BRIGHTII, PRATT, 1841, Holotype
Ann. Mag. N.H. VIII, 164, 165 ; vi, 3 ; "Christian Malford, Wilts
"Oxf. Clay." [C. M. Clay] ; Bristol Mus., C. 1803, (Stutchbury Coll.
Φ. 23 42, —, 25 ; 40, 40, —, 27·5 ; "S. 40, 39, — 33." V. E. R.

LUNULOCERAS BRIGHTII, PRATT sp.
Kosmoceratan, *acutistriatum*. See DII

Fig. 3 × 3

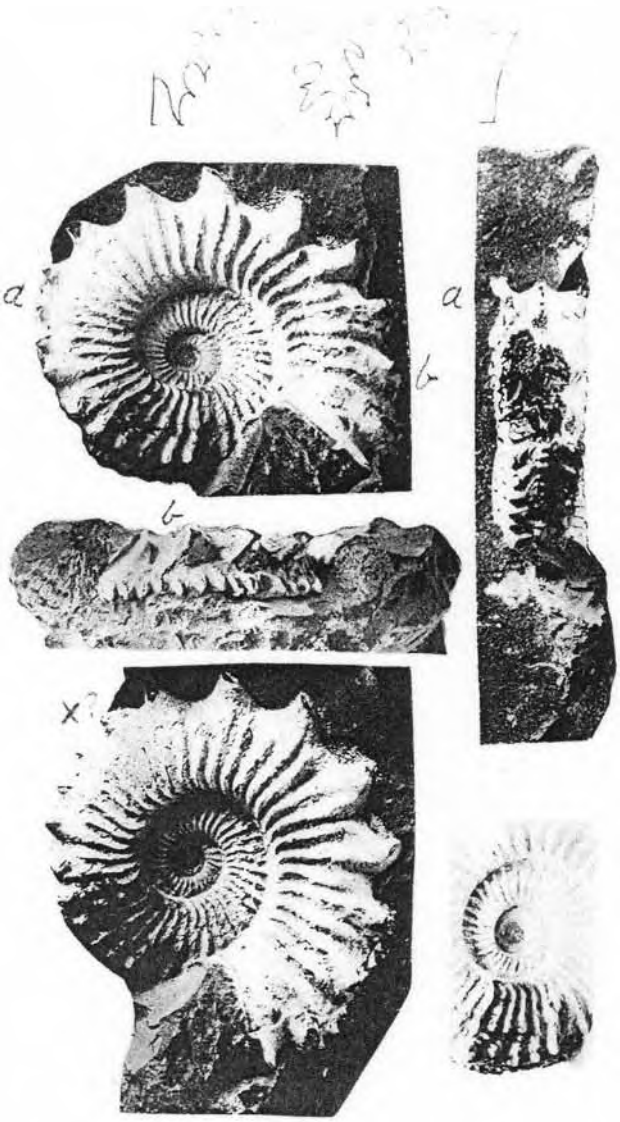
Fig. 1

Fig. 2

Fig. 2a

Fig. 1a

Fig. 1b



AMOEBOCERAS SP., spinous, S. BUCKMAN, 1923, cit. spec.
T.A., IV, 34, 40; "Shore at Ethie, Cromarty, Scotland"
"Kimm."; nodule in shale; Geol. Surv. Scotl., *M* 3391 g
S. 30, 40, 33·5, 31 : 52, 34, 37, 37·5; max. 52
Smooth to c. 13 mm. diam.; thinner than *Card. pingue*, Salfeld

AMOEBITES AKANTHOPHORUS, nov.
Rasenian (9), *akanthophorus*: Genotype, Holotype. Cf. CDXXII

TYPE AMMONITES—V.

BY

S. S. BUCKMAN, F.G.S.

With contributions, photographs and/or MS.,
from
J. W. TUTCHER, W. J. ARKELL, C. C. GADDUM,
J. PRINGLE, F.G.S., A. E. TRUEMAN, D.SC.,
D. M. WILLIAMS, B.SC.

PART LI
Pages 57-64; 20 Plates
Reprint of DXLIIIB

PUBLISHED BY THE AUTHOR
SOLD BY
WHELDON & WESLEY, LTD.
2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET
LONDON, W.C. 2
April, 1925

CONTENTS

PART LI

CHELTENHAM
NORMAN, SAWYER AND CO., LTD., PRINTERS
ST. GEORGE'S HALL

× 0·57

HAMMATOCERAS SP., S. BUCKMAN, 1920, cit. spec.
T.A. CLXXIX; Bradford Abbas, Dorset; Inf. Ool.
Fossil Bed, [mid. part]; S.B., ex J.B., Coll. 1896
S. 146, 40, 26, 31·5; 218, 39·5, 25, 32; size 245; max. c. 320

EUDMETOCERAS EUDMETUM, S. BUCKMAN, 1920
Sonninian, *eudmetum*; Paratype

Fig. 2

Fig. 1
× 0·89

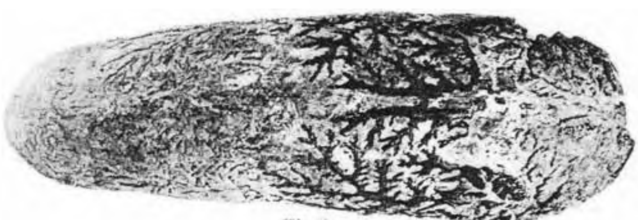
'STEPHANOCERAS' CRASSIZIGZAG α. S. BUCKMAN, 1892, cit. spec.
Q.J.G.S., XLVIII, 449; [Grange Quarry] "Broad Windsor, Dorset"
"Inf. Ool.," top beds; S.B., ex Darell, Coll. 1156
S. 81, 39·5, 52, 38; 118, 40, 53, 33; size 131; max. c. 205
Shows great difference in s.l. where worn and unworn

ZIGZAGICERAS POLLUBRUM, S. BUCKMAN, 1921
Zigzagiceratan, *pollubrum*

Fig. 3

Fig. 1

Fig. 2



S.S.B.

LYTOCERAS CORNUCOPLÆ
"Trent, Somerset" (now in Dorset); Upper Lias
Clay beds, with profusion of *Hildoceras* aff. *bifrons*
S.B. Coll. 4120; S. 51. 45. 35. —: 83. 44. 33. 31

LOBOLYTOCERAS PERLOBULATUM, S. BUCKMAN, 1924
Hildoceratan, c. *bifrons*; Paratype

Fig. 1
× 1·05

Fig. 2
× 1·05

Ammonites triplicatus
"Long Crendon, (Barrel Hill), Bucks; Portl., Creamy Limestones"
"[Lower Witchett]," white, chalky; S.B. Coll. 3536, purch.
S. 44, 36, 45 (32?); 72, 39, 46, 35

PLEUROMEGALITES FORTICOSTA S. Buckman, 1924
Gigantitan (3), *fasciger*; Paratype

× 1·05

" Cosmoceras stutchburii
" Calvert, Bucks ; Oxf. Clay, near base of brickyard
" With numerous *Avicula* cf. *ovalis*, Phill. ; J.W.T. Coll.
" S. 65. 41. —. 23 ; 114. 35. —, 31." J.W.T.

ANAKOSMOKERAS STUTCHBURII, Pratt sp.
Kosmoceratan, *stutchburii*. Cf. CDLXXXVI

Fig. 1
× 1·03

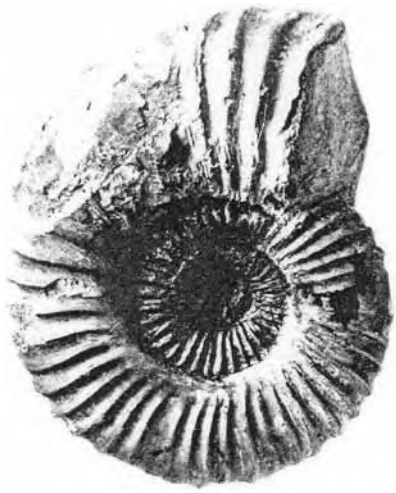


Fig. 2

Fig. 1a
× 1·03
A, B, C,
brepho-
morphs

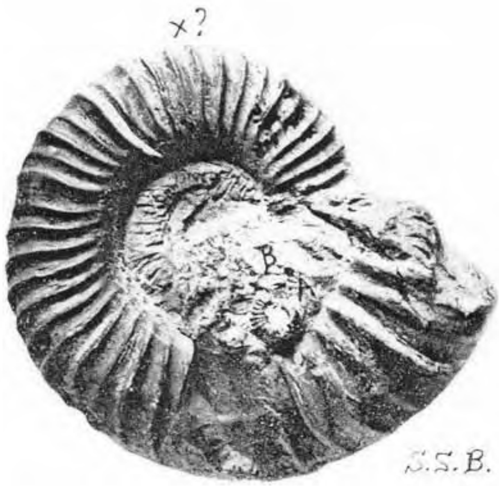


Fig. 3

AMMONITES ACUTICOSTA, STRICKLAND–J. BUCKMAN, 1844, Holotype ?
Geol. Chelt., New Ed., 103 ; Coltknap Hill, near Evesham, Worcs
Lower Lias ; Univ. Coll., Nottingham, ex R.A.C., ex J.B., Coll.
S. 33, 36, 30, 36 ; 61, 35, 30, 39 ; max. c. 42

SCAMNOCERAS ACUTICOSTA, STRICKLAND–J. BUCKMAN SP.
Schlotheimian, *acuticosta*. Cf. CCCXCV

Fig. 3 × 2

Fig. 2a

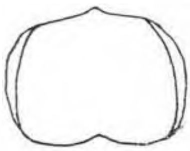


Fig. 1
× 1·1

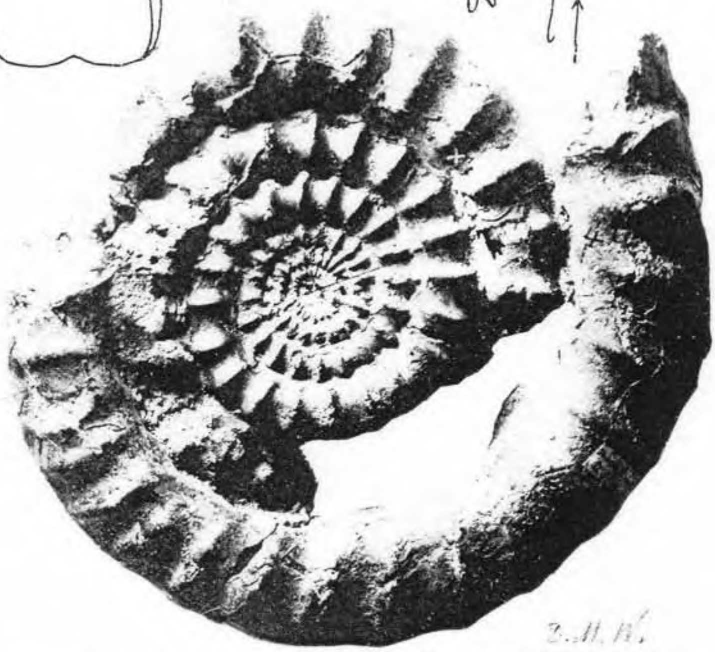


Fig. 2
× 1·2

"ECHIOCERAS RARICOSTATUM"
"Near Bristol, [near Radstock, Somerset—*raricostatus* bed.]"
"S. B., ex T. Stock, Coll. 4047"; Body ch. 1 wh. present
S. 60, 21, 26·5 (30), 63; 90, 22, 21·5 (25), 62; Max. c. 100

ECHIOCERAS NOTATUM, TRUEMAN & WILLIAMS, NOV.
Deroceratan, *raricostatoides*; Holotype. See CDXXV (T. & W.)

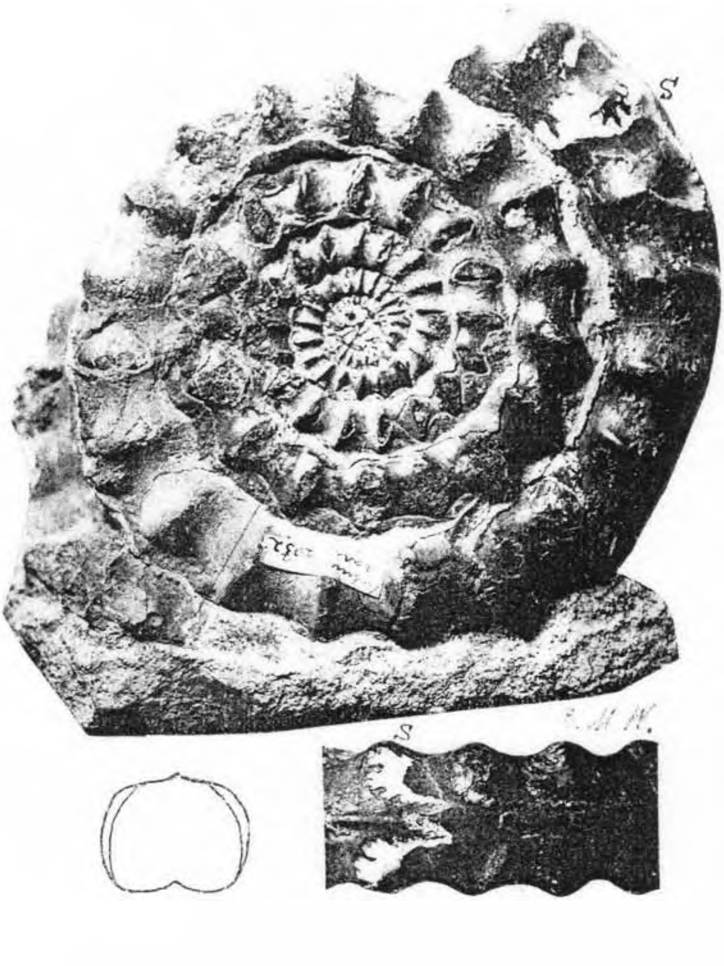


Fig. 1
× 1·1

Fig. 2a

Fig. 2
× 1·1

" ECHIOCERAS RARICOSTATUM "
" Kilmersdon Colliery Quarry, Radstock, Somerset
Raricostatus (*armatus*) bed ; S.B. Coll. 2032 "
S. 55, 20, 23·5 (30), 65 ; 83, 20, 18·5 (23·5), 64 ; size 100 ; max. c. 130 +

ECHIOCERAS CRASSICOSTATUM, TRUEMAN & WILLIAMS, NOV.
Deroceratan, *raricostatoides* ; Holotype. See DLII (T. & W.)

Fig. 3
× 3·5

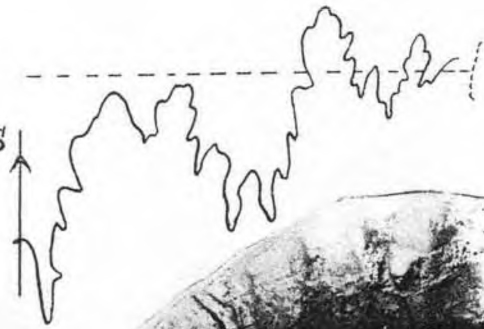


Fig. 2a

Fig. 1
× 1·09

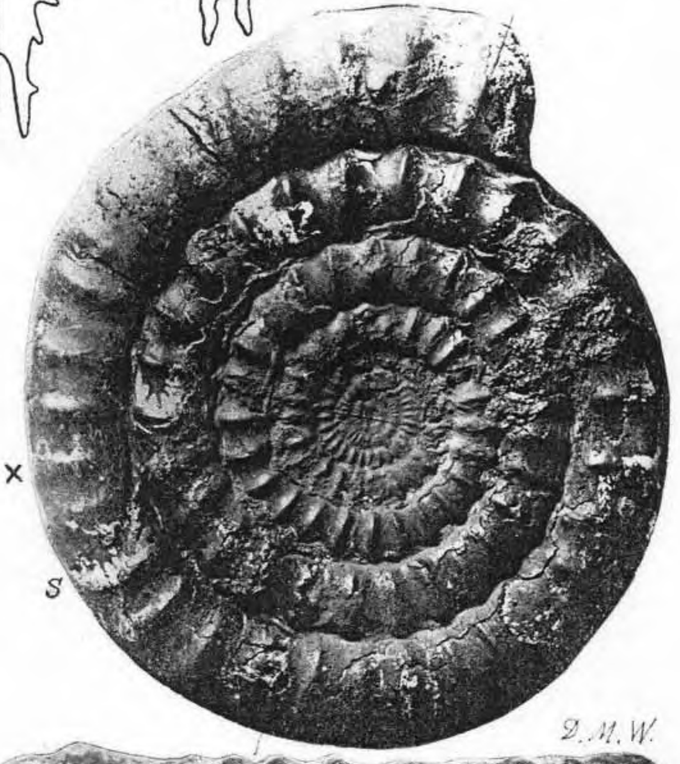


Fig. 2
× 1·2

" ECHIOCERAS RARICOSTATUM "
" Radstock Grove, Somerset ; *Raricostatus* (*armatus*) Bed "
" S.B. Coll. 4030 " ; × = last suture-line, incomplete
S. 66, 17, 21 (24), 67 ; 88, 17, 20 (21·5), 63 ; size 91 ; max. c. 110

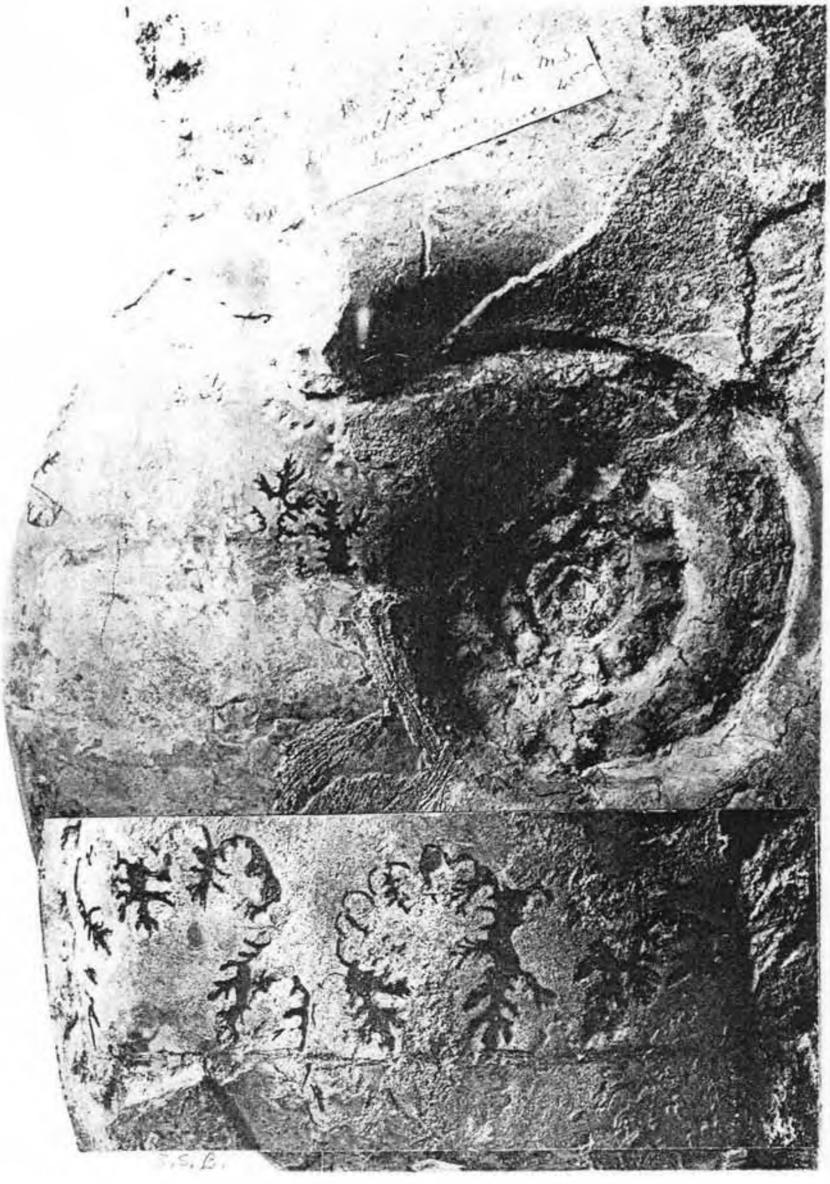
ECHIOCERAS IRIDESCENS, TRUEMAN & WILLIAMS, NOV.
Deroceratan, *raricostatoides* ; Holotype. See DLIII (T. & W.)

× 0·84

HAMMATOCERAS SIEBOLDI, Auctt.
Stoke Knap, (Quarry on east slope, towards Beaminster), Dorset
Build. Stone [5], (Q.J.G.S., LXVI, 77, § III a, 5); S.B. Coll. 1895
S. 100, 49, 30, 23; 185, 49, 27, 18; max. c. 310

PARAMMATOCERAS OBTECTUM, nov.
Ludwigian, *planiforme*; Genotype, Holotype. See CCCLVI

Fig. 1 × 0·77



×

Fig. 2

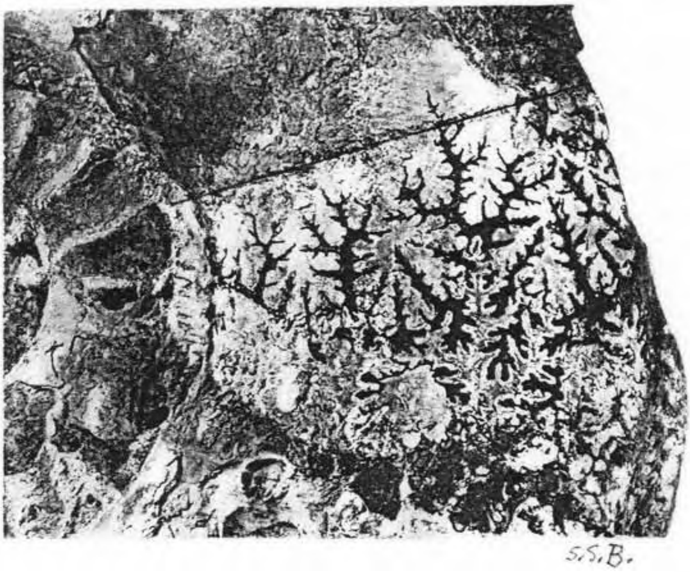
WITCHELLIA SP.
Frogden Quarry, Oborne, Dorset; I.O., green marl bed
Q.J.G.S., 1881, XXXVII, 589, § 1, 4; S. B. Coll. 455
S. 168, 40, 24, 25; 311, 46, 25, 23; max. c. 330

WITCHELLIA SUPERBA, NOV.
Sonninian, *Witchellia*; Holotype. See CDX

× 0·47

SONNINIA MESACANTHUS, S. BUCKMAN, 1893, cit. spec.
Q.J.G.S., XLIX, 485, § II, 6; *Am. variabilis*, J. Buckman, 1874, cit. spec.
"Bradford Abbas (East Hill), Dorset; [Irony Bed]," S.B. Coll. 1001
S. 164, 40, 21, 32; 293, 33, 19, 41; max. c. 350

PAPILLICERAS MESACANTHUM, WAAGEN SP., 1867
Sonninian, *sauzei*. See CCV



SONNINIA MESACANTHUS, S. BUCKMAN, 1893. cit. spec.
Bradford Abbas (East Hill), Dorset ; [Irony Bed]
Part of one side of spec. much fretted—penecontemp. erosion
S. B., ex Darell, Coll., 1901

PAPILLICERAS MESACANTHUM, WAAGEN SP. 1867
Sonninian, *sauzei*. See CCV

× 0·97

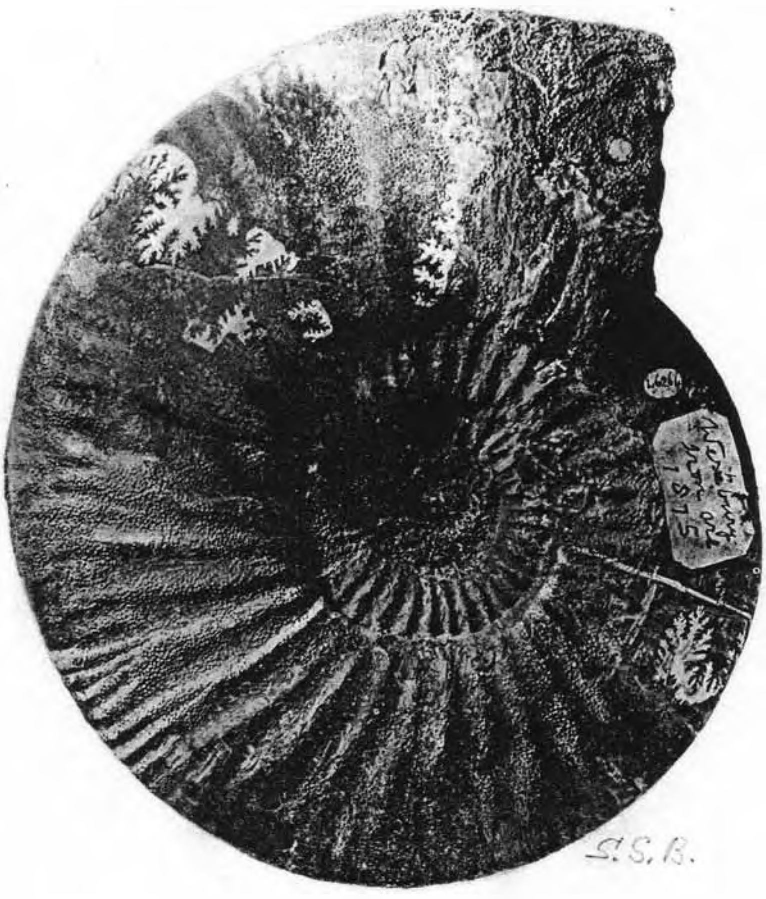
" AMMONITES MACROCEPHALUS "
" Chippenham, [Wilts] : Oxf. Clay," light blue clay
Mus. Pract. Geol. (Geol. Survey) Coll. 30565
S. 68, 43, 57 (20?) : 115, 45, c. 44, 21

PLEUROCEPHALITES LIBERALIS, S. BUCKMAN, 1924, V, 22, 23
Macrocephalitan, *Pleurocephalites* ; Holotype. See CCCXLVIII

"Ammonites jason"
"Calvert Brickyard, Bucks; 25′ below *acutistriatum* band
" (The hard band near top); C. C. Gaddum Coll., No. 37 C.
" S. 46, 48, —, 18·4; 85, 43, —, 19·5." C.C.G.

GULIELMITES OBDUCTUS, nov.
Kosmoceratan, *obductus*; Holotype. See DXXI

× 0·62



AMMONITES PSEUDOCORDATUS, BLAKE & HUDLESTON, 1877, Holotype
Q.J.G.S., XXXIII, 392, 403 ; XIII, 1 ; " Westbury, [Wiltshire]
" Ironstone " ; Mus. Pract. Geol. (ex Hudleston Coll.) 46264
Ribs, (1) c. 35, (2) c. 102 ; S.l. 32, 32, 18 of 66 mm. whorl-breadth

RINGSTEADIA PSEUDOCORDATUS, BLAKE & HUDLESTON SP.
Ringsteadian, *pseudocordatus*. See CCXXV

Fig. 1

Fig. 2
× 0·7

AMMONITES PSEUDOCORDATUS, BLAKE & HUDLESTON, 1877, Holotype
"Westbury, [Wilts]; Corallian, Ironstone;" M.P.G. 46264
S. 120, 39, 29, 31; 197, 36, 24, 34; max. c. 350

RINGSTEADIA PSEUDOCORDATUS, BLAKE & HUDLESTON SP.
Ringsteadian, *pseudocordatus*. See CCXXV

× 0·65

PERISPHINCTES EASTLECOTTENSIS
Wheatley, Brickyard, Oxfordshire ; Wheatley Sands
S.B. Coll. 3842 ; S.I. 69, 71, 45 of 45 mm. whorl-breadth
S. 130, 34, 28, 43 ; 206, 31, 27, 47 ; size 215 ; max. c. 370

WHEATLEYITES RARESCENS, NOV.
Paravirgatitan, *Wheatleyites* ; Holotype. See CCCXXXXIII

× 0·43

PERISPHINCTES EASTLECOTTENSIS
Wheatley, Brickyard, Oxfordsh.; Wheatley Sands
Yellowish brown sandstone with lydites & lamellibranchs
S.B. Coll. 3841; S. 269, 31, 29, 56; 360, 30, 23, 55; max. c. 480

WHEATLEYITES RARESCENS, NOV.
Paravirgatitan, *Wheatleyites*; Paratype. See CCCLXXXIII

× 0·7

WHEATLEYITES REDUCTUS
"Shotover Brickyard, near Oxford; Sandpit, highest doggers"
Hard bluish sandstone, betw. Shotover Fine and Grit Sands
Mus. Pract. Geol. 37363; S.l. 40, 46, 22, at 48 mm. wh.-br.
S. 113, 33, 33, 42; 162, 32, 32, 47; max. c. 280

SHOTOVERITES PRINGLEI nov.
Paravirgatitan. *pringlei*; Genotype, Holotype. See CCCLXXXIV

TYPE AMMONITES—V.

BY

S. S. BUCKMAN, F.G.S.

With contributions, photographs and/or MS.,
from
J. W. Tutcher, W. J. Arkell, C. C. Gaddum,
J. Pringle, F.G.S., A. E. Trueman, D.SC.,
D. M. Williams, B.SC.

Part LII
Pages 65-78; 19 Plates;
Revise of DXXIV

Published by the Author

Sold by
WHELDON & WESLEY, Ltd.
2, 3 & 4, Arthur Street, New Oxford Street
London, W.C. 2
June, 1925

CONTENTS

PART LII

CHELTENHAM
NORMAN, SAWYER AND CO., LTD., PRINTERS
ST. GEORGE'S HALL

Fig. 2

Fig. 1
× 0·93

AMMONITES BONONIENSIS
Long Crendon, Bucks, N.W. Pit; Green Marl Bed
(T.A. IV, 26, Tab. II, 21); S.B. Coll. 3526; Sl. 52, 50, 32 of 38 mm.
S. 86, 31, 39, 47; 30 ribs; 134, 29, 35, 50; 34 ribs

LEUCOPETRITES LEUCUS, S. BUCKMAN, 1922
Behemothan (4), *leucus*; Plesiotype, Cf. CCCVI

AMMONITES ELIZABETHÆ
Calvert Brickyard, Bucks; Calvert Clays, top hard band
Datum line, *acutistriatum* band; S.B. Coll. 4304
S. 32, 40, —, 30; 54, 38, — 33? lat. aur. 28 mm.

SPINIKOSMOKERAS ACUTISTRIATUM, ROBSON SP.
Kosmoceratan, *acutistriatum*; Plesiotype. Cf. CDXXXVII

Fig. 2

Fig 1

AMMONITES PLICATILIS
Cf. *Perisph. parandieri*, Loriol, 1903, 90, VIII, (non VII, type)
S.B. Coll. 2934; EL, 64 of 70; L1, 70, L2, 30, Aux., 36 of 67 mm.
S. 160, 49 ribs; 270, 26, 26, 55; 46 ribs; 417, 24, 23, 59; 36 ribs
Ribs 1 to 3, 4; large ribs single; venter flattened. Fig. 2, Synthetogr.

ARISPHINCTES ARIPREPES, S. BUCKMAN, 1924
Perisphinctean, *martelli*; Genotype, Holotype. Cf. CCLXXXII

Fig. 1
× 1·1

Fig. 2

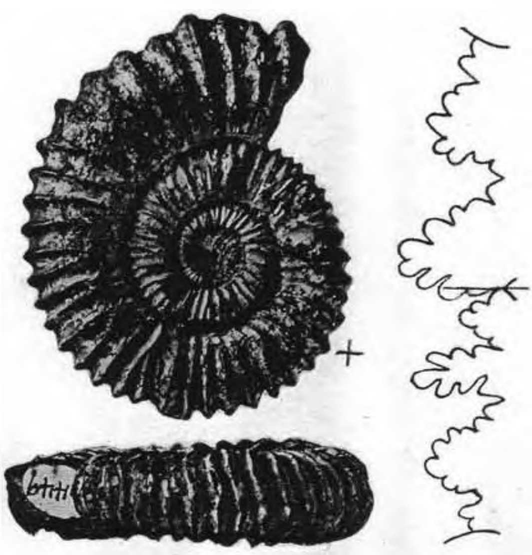


Fig. 3
× 3

S.S.B.

PELTOCERAS cf. INTERSCISSUM ; S. BUCKMAN, 1920, cit. spec.
T.A. III, 10, 17 ; Loch Staffin, Isle of Skye, Scotland"
"Oxford Clay" ; Mus. Pract. Geol. 30449 ; ribs 35
S. 26, 31, 29·5, 42 ; 50, 30·5, 24, 48 ; max. c. 50

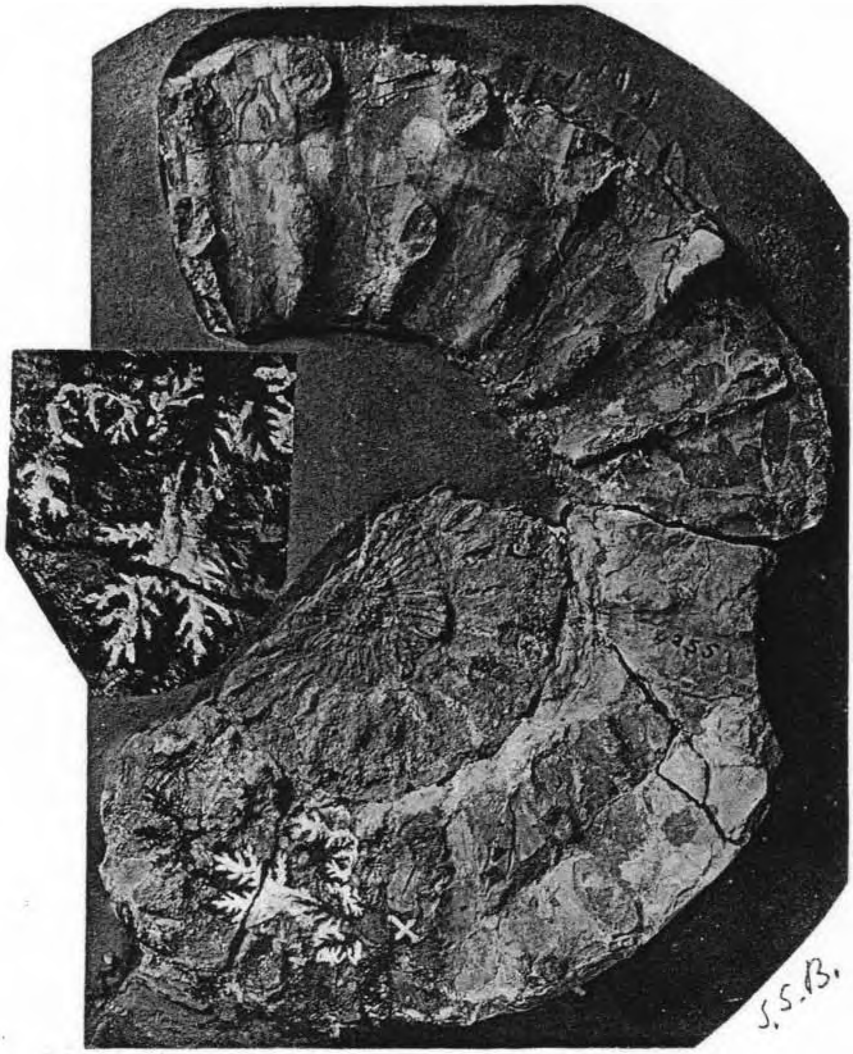
PELTOCERATOIDES TOROSUS, OPPEL SP., 1866
Cardioceratan, *arduennensis*. Cf. XCIX

AMMONITES CONSTANTII
Jordan Cliff, under Overcomb House (Old Coastguard Station)
Oxf. Clay, Jordan Cliff Beds, dark cl.; S.B. Coll. 4255
S. 163, 37, —, 43; 246, 32, —, 47; max. c. 320

PELTOMORPHITES HOPLOPHORUS, NOV.
Cardioceratan, *hoplophorus*; Genotype, Holotype. Cf. DLXIII

Fig. 1 × 0·53

Fig 2



PELTOCERAS INCONSTANS
Jordan Cliff, Preston, near Weymouth, Dorset
Oxf. Clay, crushed in dark clay; S.B. Coll. 4255

PELTOMORPHITES HOPLOPHORUS, NOV.
Cardioceratan, *hoplophorus*; Genotype, Holotype. Cf. DLXIII

AMMONITES JASON
Calvert Brickyard, Bucks; Calvert Clays, top hard band
Datum-line, *acutistriatum*-band; S.B. Coll. 3803
S. 77, 39, —, 26; 119, 40, —, 27; size c. 122

HOPLIKOSMOKERAS SPICULATUM, NOV.
Kosmoceratan, *hoplistes* (*acutistriatum*); Holotype. See CDXC

× 0·86

Fig. 2

Fig. 1

PERISPHINCTES LINKI
Cowley (near Industrial School), Oxford; Oxf. Oolites
Brown Course, *Pygaster* Beds; S.B. Coll. 3491, purch.
S. 91, 31, 27, 44; ribs 42; 125, 28, 25, 48; size 143
Ribs, ult., 33 (1 to 4, 5); secondaries fade after c. 100 mm.

LIOSPHINCTES APOLIPON, nov.
Perisphinctean, *antecedens*; Genotype, Holotype. Cf. CCLXXXII

Fig. 1

Fig. 2
× 0·94

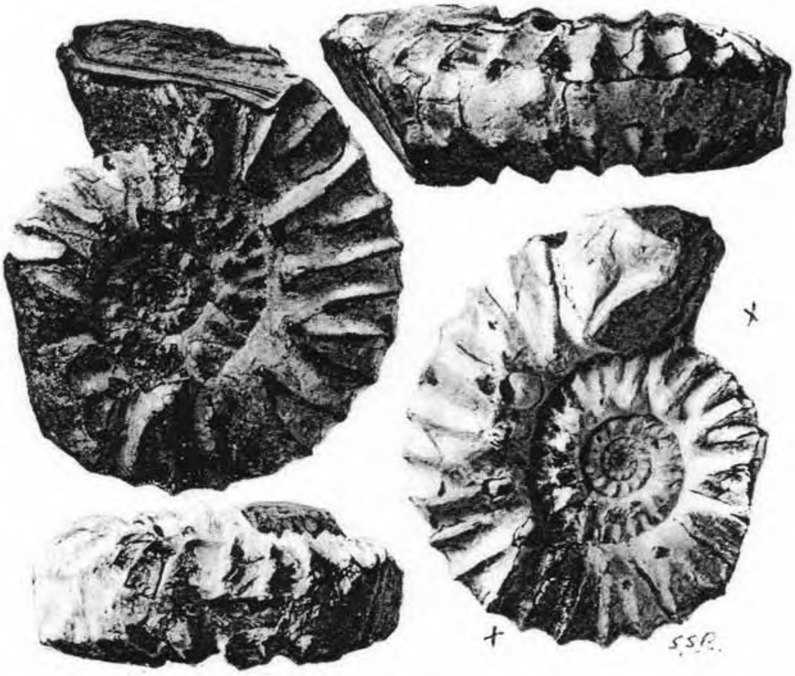


Fig. 2a

Fig. 1a
× 0·94

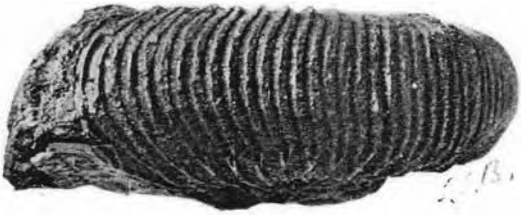
" AMMONITES STEPHANOIDES "
" Osmington, [Dorset] ; K.C." = Kimmeridge Cl. ; Hudleston lab. & Coll.
Dorset County Mus. ; Cf. *Hoplites undoræ* ; S.l. 35, 42, 12 of 14.5
S. 36, 33, 36, 37 ; 60, 33, 35, 42 ; max. c. 62

AULACOSTEPHANUS PLATAULAX, NOV.
Physodoceratan, *eudoxus* ; Holotype

Fig. 2

Fig. 1

Fig. 3



"AMMONITES PECTINATUS"
"Kimmeridge Shale Works, [Dorset]"; Hudleston lab. & Coll.
Cf. *Aulacosph. jubilatus*, Schneid, 1915; Dorset County Mus.
S. 40, 45, 32, 25; c. 51 ribs; 75, 35, 29, 37; 64 ribs; max 75
L1, 48, L2, 33 of c. 13·5; Venter runcinate to c. 60 mm. diam.

PECTINIFORMITES BIVIUS, nov.
Pseudovirgatitan, *bivius*; Genotype, Holotype. Cf. CCCLXXXI

Fig. 1

Fig. 2

AMMONITES BIPLEX
Long Crendon, Bucks; brickyard by Lion Spring
Hartwell (Crendon) Clay; red nodule band; S.B. Coll. 3797
S. 54, 33, 40, 48; 78, 36, 38, 43; ribs 31; size c. 90
Max. c. 120; Sl. 53, 63, 33 of 17·5 mm. whorl-breadth

HOLCOSPHINCTES PALLASIOIDES, NEAVERSON 1924
Pseudovirgatitan, *pallasioides*; Chorotype

PERISPHINCTES OKUSENSIS, SALFELD, 1913
(Ob. Jura N.W. Europa; N. Jahrb. Beil-Bd. XXXVII, 130, 198-200)
Okus Quarry, Swindon, Wilts; Portl. Stone, Cockly Bed
S.B. Coll. 4112; Last half-whorl crushed

KERBERITES OKUSENSIS, SALFELD SP.
Behemothan, *kerberus*; Genotype, Topotype. See DXX

PERISPHINCTES OKUSENSIS, SALFELD, 1913
Okus Quarry, Swindon, Wilts ; S.B. Coll. 4112
S. 189, 30, 35, 44 ; 235, 28, 30, 49 ; size 295
Max. c. 400 ; EL, 51, L1, 54, L2, 18 of 58 mm. whorl-breadth

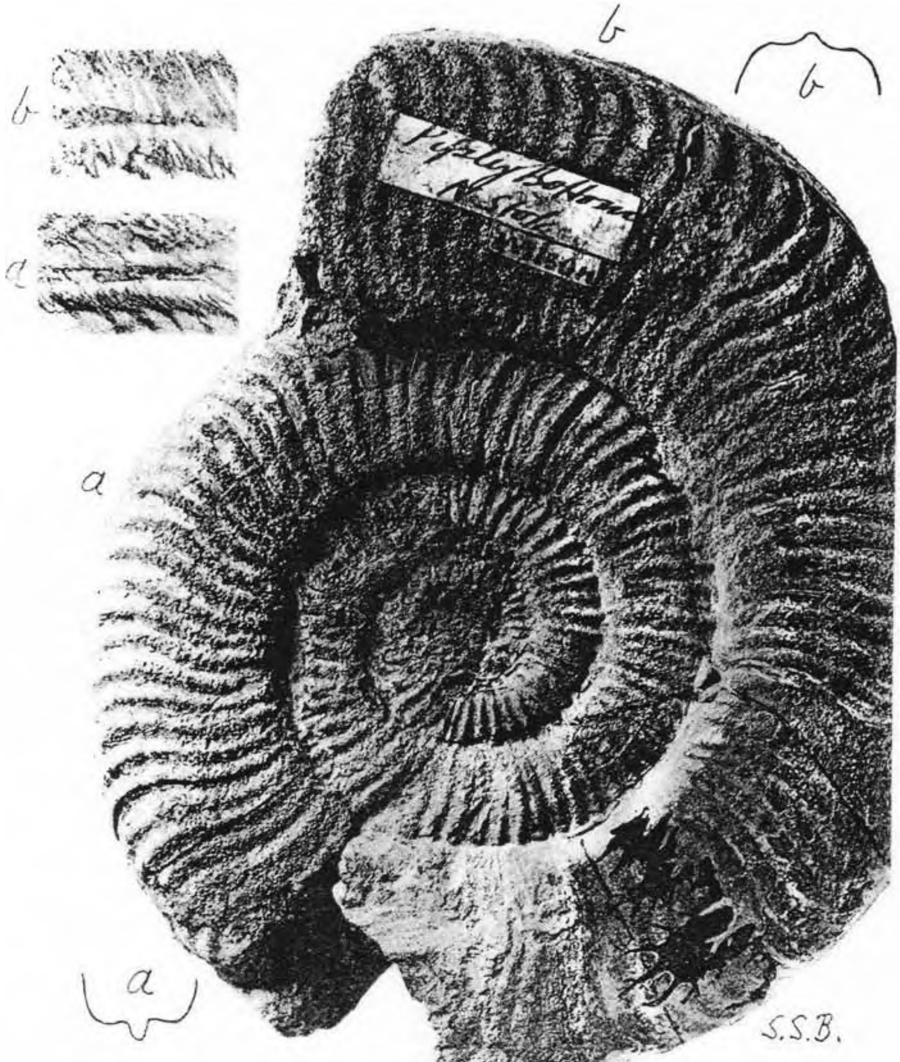
KERBERITES OKUSENSIS, SALFELD SP.
Behemothan, *kerberus* ; Genotype, Topotype. See DXX

Fig. 2b[1]

Fig. 2

Fig 1

Fig. 2a[1]



Catulloceras subaratum
Pipley Bottom, North Stoke, Somerset ; hard, grey sandrock
(S.B. in Reynolds & Vaughan, Q.J.G.S. LVIII, 1902, 736, [4])
S.B., ex E. Wilson, 4305 ; S. 83, 30, 20, 47 ; 140, 28, 18, 48 ; max. c. 185

DACTYLOGAMMITES DIGITATUS, nov.
Dumortierian, *Catulloceras* ; Genotype, Holotype

Fig. 1 × 0·79 Fig 2

" AMMONITES OPPELI, SCHLOENBACH "
(Deut. geol. Ges. XV, 1863, XII, 2) ; " Radstock Grove, Somerset
" M. Lias above *armatum* [*leckenbyi*] ; J.W.T. Coll.
" S. 75, 52, 21, 6 ? ; 155, 59, 22, 5 " ; max. c. 230+

METOXYNOTICERAS OPPELI, SCHLOENBACH SP.
Polymorphitan, *phyllinus*. Cf. CDLXV

Fig. 2 Fig. 1 × 0·73

OXYNOTICERAS SIMILLIMUM.
"Chapel Quarry, Wells Way, Radstock, Somerset; Mid. Lias
"Above *armatum* [*leckenbyi*]. No trace of ribs; J.W.T. Coll."
S. 90, 56, 19, —; 151, 57, 20, 4·6; max. c. 220+

HOMOXYNOTICERAS HOMŒUM, NOV.
Polymorphitan, *phyllinus*; Genotype, Holotype. Cf. DLXXIV

× 0·74

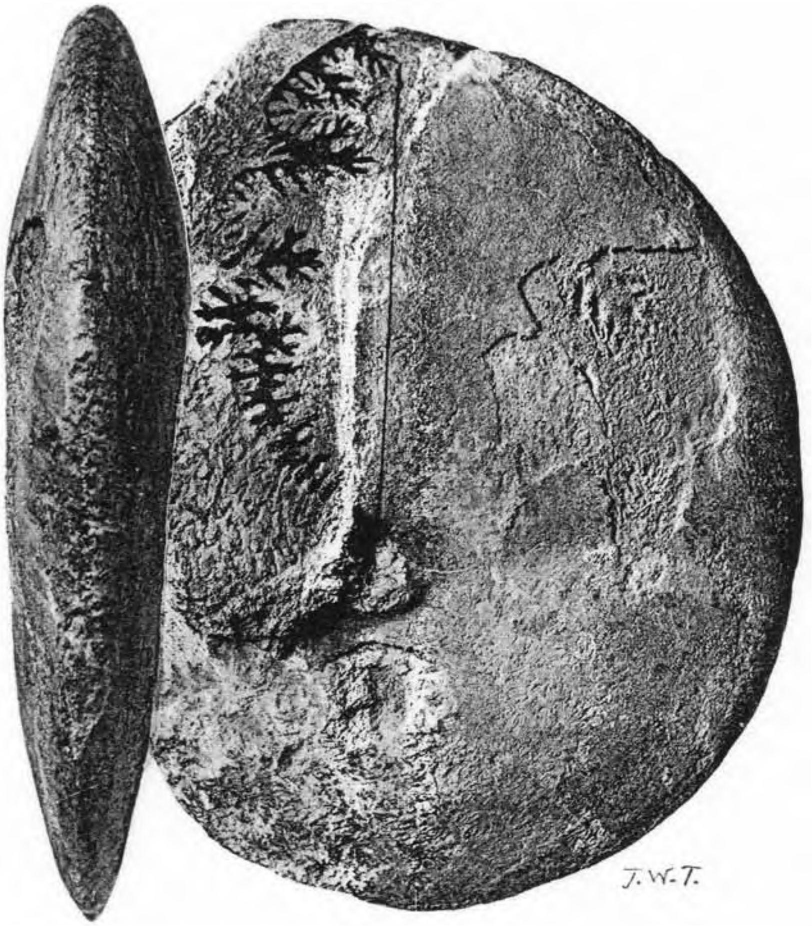


Fig. 2 Fig. 1

OXYNOTICERAS SŒMANNI
" Clandown, near Radstock, Somerset ; Mid. Lias,
Jamesoni zone in broad sense ; J. W. T. Coll."
S. 98, 57, 11, — ; 162, 57, 22, 0 ; max. c. 240+
Umbilicus filled with test ; no keel ; venter rounded

KLEISTOXYNOTICERAS COLUMELLATUM, NOV.
Polymorphitan, *phyllinus* ; Genotype, Holotype. Cf. DLXXV

TYPE AMMONITES—V

BY

S. S. BUCKMAN

PART LIIA
Title Page and Index
(Pages 79—88)

PUBLISHED BY THE AUTHOR

SOLD BY

WHELDON & WESLEY, LTD.
2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET
LONDON, W.C. 2

August, 1925

TYPE AMMONITES
V

The mere fact of naming an object tends to give definiteness to our conception of it. We have then a sign which at once calls up in our minds the distinctive qualities which mark out for us that particular object from all others

George Eliot,
July 20th, 1856

TYPE AMMONITES—V

BY

S. S. BUCKMAN, F.G.S.

With contributions, photographs and/or MS.,
from
J. W. TUTCHER, W. J. ARKELL, C. C. GADDUM,
J. PRINGLE, F.G.S., A. E. TRUEMAN, D.SC.,
D. M. WILLIAMS, B.SC.

VOL. V

Pages 1—88 ; Text Figures 1—8
Plates 194 and 6 re-issued

PUBLISHED BY THE AUTHOR

SOLD BY

WHELDON & WESLEY, LTD.
2, 3 & 4, ARTHUR STREET, NEW OXFORD STREET
LONDON, W.C. 2

August, 1925

CONTENTS

Vol. V

With 200 plates (6 re-issued)

CHELTENHAM
NORMAN, SAWYER AND CO. LTD., PRINTERS
ST. GEORGE'S HALL

Generalities

The commencement of Vol. V gives opportunity to break off for awhile the study of Jurassic Chronology, in order to discuss certain other matters.

The manner in which Type Ammonites is issued—single plates for each specimen, with rare exceptions—allows of the work being bound in various ways :—1, bibliographic, or exactly as it is issued ; 2, notational, the pages and plates being taken from the parts and re-arranged according to their numerical order ; 3, chronological-zoological, the text arranged by itself in notational order, the plates placed according to the chronological order of the strata—from Caloceratan to Gigantitan—without reference to their notational order ; 4, zoological-chronological, the text as before, the plates according to the zoological order of the genera ; 5, geographical, the plates arranged according to the particular districts from which the specimens came. All these different methods of arrangement have special advantages. The first, or bibliographic, method is particularly useful to the bibliophile, giving the order in which the work was issued, and the dates when new names were proposed—valuable evidence for priority of publication : for such manner of binding, which involves no trouble of re-arrangement, all the wrappers should be retained, otherwise the work, from the bibliophile standpoint, is incomplete.

In the second, or notational, method, considerable re-arrangement is required to bring text and plates into numerical order. The wrappers would not be retained, but the title-pages to each part should not be discarded : they should be bound at the beginning or the end, as evidence for the contents of each part as originally issued, and for dates of pages and plates. This method of binding is most suitable for libraries of institutions, as each volume accords with its own index.

The other methods of arrangement are particularly suitable for students and specialists, but they have two disadvantages : the work cannot be given permanent binding until the publication of the whole be completed—temporary binding cases must be used—and the order of the plates makes the indexes useless, so far as the plates are concerned. But the advantage of bringing genera and species together for rapid comparison under the chronological-zoological or the zoological-chronological arrangements is particularly great : the difference between them is that, in the first case, when there is more than one species or genus of the same date—of the same hemera—their sequence is finally to be determined by zoological position ; in the second case, the zoological is the first governing method, and the chronological is subsidiary. The chronological-zoological arrangement shows a most interesting picture of the faunal sequence during geological time, leading particularly to a study of hemeral succession. In many cases it brings allied genera and species closely together for comparison : thus the Tulitidæ of the Tulitan Age come together, and the various species of *Morrisiceras*, divorced in the original order of issue, are brought into sequence, so that the differences between the species are readily noted: they stand separated from *Morrisites*, a genus of an earlier date. But the Oppelacea, though, occasionally, they may come into contact, are necessarily often separated by other species, for the forms occur at many different dates, from Ludwigian onward. When more than one genus or species of the Oppelacea occurs in the same zone, then that one which is adjudged to show the least advance would be placed before that which showed more advance from the primitive condition, though such advance may not necessarily be elaboration. it may be simplification, or, as it is usually termed, catagensis. This is the subsidiary zoological factor governing the chronological arrangement.

In the zoological-chronological method all the Oppelacea would come together, no matter to what dates they belonged. And the geologically earliest of the Oppelacea, *Præstrigites prænuntius*, (T.A., Pl. CDLXVI), of the Ludwigian, would not come first, for this is not a primitive type, but one particularly advanced, shown by its possession of a hollow carina. On the biological features of some of the Oppelacea more will be said later—see below.

The geographical arrangement would be useful to those who may be making either faunal analyses or special studies of the faunas of particular districts. In this arrangement division might be made into various small areas or into larger districts: 1, South England; 2, Mid-England; 3, Yorkshire; 4, Scotland, Ireland and foreign, or into 1, Southumbria; 2, Northumbria; 3, Scotland, which has a rich fauna of Jurassic Ammonites awaiting publication, and 4, extra-British, a section not likely to be large. But in any geographical arrangement it is obvious that a subsidiary sequence has also to be used, it may be one of the arrangements 2, 3, or 4.

Some years ago, Mr. V. E. Robson, F.G.S., when Assistant-Curator at the Bristol Museum, prepared a good paper on Pratt's Christian-Malford types, several of which belong to that institution. The specimens were photographed by Mr. J. W. Tutcher. But difficulties arose as to the publication of his paper, so, though ready for the press, it was laid aside. Now Mr. Robson has most kindly placed his paper and illustrations in my hands for publication, as far as possible, in this work. Mr. Robson's names and valuable information will be distinguished by the initials V.E.R.

As so many of these specimens are crushed, so that there is risk in their travelling, and as proportions at only one point are given in Mr. Robson's MS., measurements marked ϕ are those taken by myself from the photographs; those measurements taken by Mr. Robson from the specimens themselves are marked S. and V.E.R. But all measurements of crushed specimens can only be approximate. Two uncrushed specimens, *Am. brighti* (paratype) and *Am. fluctuosus* (paratype), Dr. H. Bolton, F.R.S.E., has kindly placed in my hands on behalf of the Bristol Museum: of these, it will be possible to give actual proportions (S). Of these specimens I have taken additional photographs to illustrate suture-lines. Lately, Dr. Kitchin has sent to me the fine series of Christian-Malford specimens contained in the Museum of the Geological Survey, some being from Pratt's collection, and presumably, therefore paratypes. To all these gentlemen the author expresses his hearty thanks for such kind assistance. He also takes the opportunity to express the same to the Librarian of the Geological Society, Mr. Arthur

Greig, for most considerate help in the matter of literature—a very great boon.

Zoological Arrangement

The biologically earliest of the Oppelids, if not of the Oppelacea, is *Diplesioceras diplesium*, (T.A., Pl. CLXXVII), of the Parkinsonian, which, with its strong tubercles and carinate-bisulcate venter points back to the coronate and carinate-bisulcate radical of the Sonninines and Amaltheids. After it would come the carinate species usually placed in *Oppelia*, where the carinate-bisulcate venter has degenerated to mere fastigation with slight carina, which passes in some cases to rounded, while the tubercles have degenerated into costæ, at intervals stronger than their intermediaries. After these come true *Oppelia*, *O. waageni* (T.A. III., p. 25), where the costation plan remains the same, but the venter shows early decline to rounded.

The Strigoceratidæ displayed in Plates CDLXVI–CDLXXII are given as illustrations of faunal repetition of similar forms through successive hemeræ: the deposits made during such hemeræ may be no more than 100 feet in Dorset, but elsewhere, taking maxima, they may run to 300 feet or more. These plates also illustrate homœomorphy, though there is more likeness between some Strigocerates and oxycones of other families than there is among the Strigocerates themselves.

Some of these Strigoceratids were mentioned as Strigoceratoids in my paper 'Jurassic' Time, Q.J.G.S., LIV, (1898), Tab. II, facing p. 451. There they are given as diverse shoots from a stem originating in *Lissoceras* of *Sonninia* [*Shirbuirnia*] hemera; but such origin is vitiated in two ways: 1, that these are earlier Strigocerates—*Praestrigites* and *Varistrigites*; 2, that *Lissoceras* is unlikely to produce septicarinate forms. The Strigoceratidæ would be, biologically, later than the Oppelidæ, as, while losing the sulcate venter, they have elaborated the carina into the strong septicarinate form; but the biologically earliest Strigoceratid is not the geologically earliest—that is *Strigoceras* of the Parkinsonian, for though its young stage shows binodulation, retained in the adults as strong longitudinal ridges, these adults have progressed to highly specialized (elaborate) suture-line, to a septicarina, and to longitudinal lineation—all features more highly specialized than those of the Oppelidæ. Degeneration of the longitudinal ridges would place the other Strigocerates (T.A. CDLXVI—CDLXXI) after *Strigoceras* in regard to that character, but in the matter of suture-line, while *Plectostrigites* (T.A. CDLXXI) shows greater complication than *Strigoceras* and therefore takes a later biological position, both in this respect and in the case of the decay of longitudinal ridges, *Strigites* (CDLXIX, CDLXX), shows suture-line development which is less complicated than *Strigoceras*, is possibly not a degeneration thereof, but represents an earlier phase. Here characters pull in opposite ways for biological position (see p. 10).

The bituberculation of young *Strigoceras* is possibly an earlier development than the unituberculation of *Diplesioceras*, making it reasonable to suppose, however, that the character of *Diplesioceras* is degradation from bituberculation. If so, the separation of Oppelids and Strigoceratids took place in the bituberculate stage; if not, if *Diplesioceras* never passed through the bituberculate stage, then the separation must have been still earlier—the bituberculate stage carries *Strigoceras* into association with *Paltopleuroceras*, *Haplopleuroceras* and

Zurcheria.

A primitive suture-line comparable with that of *Haplopleuroceras* etc., is found in the Lissoceratidæ (*Lissoceras*, Pl. CD) and *Toxamblyites* (Pl. CDLXXIII). This family may be regarded as rivals with Oppelidæ for earliest biological position in the *Oppelacea*. In estimating possible descent, it is necessary to take what may be called the lowest common denominator of the characters found in any allied groups of genera—in this case, a form which could exhibit the primitive suture-line of Lissoceratidæ, the unituberculation and carinati-bisulcation of *Diplesioceras* and the bituberculation of *Strigoceras*. If these genera have a common origin, the ancestor must possess these lowest characters in association, or must be in such a stage as would evolve these characters. The smooth stage of *Lissoceras*, as shown by *L. oolithicum* (d'Orbigny) and *L. psilodiscum* (Schlœnbach) is not mentioned in this connexion, because it is not primitive: it is a decay from costate, shown by *Toxamblyites arcifer* and *Lissoceras semicostulatum*. Then the question arises whether the rounded venter of *Lissoceras* is primitive, or if it be degenerate from carinate like that of *Oppelia*. There is every reason to suppose that it is a post-carinate instead of a pre-carinate stage, from the example of *Oppelia* and from the obvious affinity which Lissoceratidæ have to Oppelidæ. But even traces of the carinate condition might not be found in the inner whorls of *Lissoceras*, and possibly not in those of *Toxamblyites*—the phenomenon of saltative palingenesis. Only the discovery of a Lissoceratid form with carination would prove this link in phylogeny. An approximation to what is required is found in *Stegoxyites* (Pl. CDLXXIV), which shows a suture-line of Lissoceratid pattern, and has a venter whose sides slope flatly, like the roof of a house (*stegos*) towards a feeble median carina (*parcicarinatus*). But *Stegoxyites* is hardly a Lissoceratid: it joins up with *Bradfordia* and sundry other forms into a genetic series distinguished by a concave inner lateral area bounded inwardly by a rather prominent umbilical ridge—features absent from the Lissoceratids. But as *Bradfordia* and the other forms show a rounded *Lissoceras*-like venter, presumably a decline from the *Stegoxyites* pattern, the argument for a Lissoceratid with carination assumes even greater probability. If there be a carinate stage in the Lissoceratidæ, then the origin of the family may be from a *Diplesioceras*-form, with simple suture-line; but if the rounded venter of the Lissoceratidæ be primitive, then the origination of the family must be from an uncarinate form, one earlier than the common stock of *Diplesioceras* and *Strigoceras*—in fact, so early that the removal of the Lissoceratidæ from the Oppelacea would have to be considered.

Hebetoxyites, (Pl. CDLXXV), with *Kleistoxyites*, (Pl. CCCXVII), *Amblyoxyites* (Pl. CCCIII) and other forms to be described, makes the family Hebetoxyitidæ. This family shows a rounded venter of Lissoceratid pattern, a suture-line, in *Hebetoxyites*, not much advanced from that of *Lissoceras*, but in *Amblyoxyites* developed into almost the Oppelid stage of complexity. But distinction from Oppelids is to be found in the costation: in Oppelids the costæ are irregular—there are major ribs separated by sundry minor ribs, and both are often confined to the outer part of the lateral area; in Hebetoxyitidæ the ribs are continuous across the whorl, rarely showing major and minor costation.

In general appearance the Hebetoxyitidæ nearest to *Hebetoxyites* have a remarkable likeness to the Strigoceratidæ—to *Strigites* and *Plectostrigites*; but there is absence of septicarina, absence of longitudinal lineation, and a simpler suture-line. Instead of longitudinal lineation, some exceptionally well-preserved specimens show growth-lines developed almost into striation or lineation, not running parallel with the costation, but somewhat obliquely across it, especially on the outer area.

The biological position of the Hebetoxyitidæ would be after that of the Lissoceratidæ. There is good reason to suppose that the venter was carinate at one stage—the beginning of last whorl in *Hebetoxyites* (Pl. CDLXXV) shows blunt fastigation—and that regular ribs may not be primitive: thus the origin of the family would be similar to that of Oppelids.

It is by analyses of characters in this manner that the descent and the biological position of families and genera are to be worked out—not by rash assumptions of affinity from general similarity, which, too often, may be merely homœomorphic deceptions. Assumptions which postulate the sudden change of a highly-specialized feature into one which is unspecialized are to be avoided, for it has to be remembered that the more highly-specialized a feature becomes, the more does the law of the irreversibility of evolution apply. A tetradactylous platyrrhine monkey cannot be placed as the ancestor of the pentadactylous *Homo*; for the tetradactylous character is a highly specialized feature while the pentadactylous is primitive. The tetradactylous platyrthines cannot grow a thumb again, though they might convert another dactyle into a thumb-like organ. The pentadactylous *Homo* must have separated from the platyrrhine stock before the tetradactylous character was evolved; but the possession of pentadactylism by *Homo* shows that there should be a pentadactylous ancestor common both to platyrrhine monkeys and to *Homo:* the principle of the earliest common denominator.

An assumption that geological association involves affinity would be particularly difficult to sustain. It would postulate that all strata are complete, that all species have been preserved, and are known. Whereas there is good reason to suppose that the strata are very incompletely preserved, that not more than about 25 per cent. of the once living species of Ammonoids are known to us; that of the unknown species a third has been destroyed by various causes, a third has not yet been extracted from the rocks, and a third lies buried in strata which are not likely ever to be accessible. The last applies particularly to primitive deep-water forms, which gradually evolving as they migrated to shallower seas could give rise to those successive series of similar forms with which science is now making us familiar. The earliest to arrive in shallow water are not necessarily the most primitive: in fact, taking the Strigoceratidæ, in general their geological position is in inverse order to their biological development — those retaining primitive characters are in the later strata, those which lack them—having passed beyond them—are in the earlier. There is a longer history, a greater lack of unknown ancestral forms, behind the earliest Strigoceratid than behind the latest. It is not from the earliest forms, but from the latest, that the threads of ancestry can be picked up; because it is in the latest that ontogeny reveals most. This phenomenon of biological order being often inverse to geological may be very frequently noted. When a highly specialized form like *Praestrigites* suddenly appears without any ancestry behind it—is truly cryptogenetic—the incompleteness of the zoological record is revealed. But there is another phenomenon involved, that the most highly specialized forms tend to die out quickly, and that the race is constantly being replenished from the least specialized: they make successive waves which become more and more specialized, attaining to the degree of evolution, or even passing that of their predecessors. But in order to account for there being more of the simple in the later than in the earlier forms, it is necessary to suppose that what may be called the migration-centre of the primitive stock is gradually and slowly moving towards the shallow-water areas. As an illustration of how little of the Ammonite fauna is known to us, and how just a chance may lead to an important discovery, the account of the finding of *Diplesioceras diplesium* may be given. A short visit to the quarry at Vetney Cross, Bridport, resulted in my return with, as I supposed, no spoil of much value, and the comforting greeting that, as predicted, I had wasted my time. But knocking off the matrix from another specimen revealed a tubercle and ribs of something recognized as quite unknown to me—to expose eventually a species, which seems to throw a flood of light on the origin of Oppelids. It suggests, moreover, that there must be a whole series of forms with which we have no acquaintance yet, even though thousands of Ammonites from the same bed in the Bridport district have been seen by me.

The arrangement of the plates in the zoological order is a very good exercise, which will necessarily stimulate thought on questions of evolution. There is this difference between the chronological and the zoological arrangements—that in the first the order of sequence is mainly a question of fact, determined by stratigraphical sequence, vitiated only by various imperfections in the evidence. But in the other the order depends mainly on personal interpretation, giving opportunity for wide difference of opinion. But even where there might be agreement in method, there are cases where a difficulty in deciding order would arise—where one species is strong in character A, but weak in B, and an allied species is the reverse. I have suggested a plan of numerical valuation of characters to meet this (Q.J.G.S., LXXIII, (1918), 296; T.A. III, (1920), 14; T.A. IV, (1923), 54).

But then, if two genera come out with the same value, the chronological order would have to be the subsidiary deciding factor in the zoological arrangement.

On Certain Criticisms

A reviewer of T.A. IV ('Nature,' Vol. CXIII, Feb., 1924, p. 232) has no good word for the palæontological part of the volume, but praises the chronological portion. Much may be forgiven him for this, as the chronology has received the strongest condemnation from those who have failed to grasp its significance. The reviewer has not so failed: he aptly remarks, "In view of recent criticisms of zonal palæontology, it cannot be emphasized too strongly that modern detailed work is not a mere splitting up of existing zones into minute subdivisions, but an amplification of the very incompletely understood Jurassic record." The same claim, however, may be made for modern detailed work in palæontology: it is a necessary corrollary to the chronology—without it that would have no basis.

This reviewer curtly condemns the numerical plan for finding the natural order. Apparently, he has mistaken the meaning of natural order—or natural biological sequence. But some such plan of estimating relative value of characters must consciously or unconsciously be employed in Botany in deciding the position of Cruciferæ before

Compositæ or of genera within the Compositæ. It must also be similarly employed in Zoology. In applying the principle of Palæontology, giving it greater precision by placing numerical values on the various characters, greater definiteness is given to what is really a very old plan. At any rate, it leads to more critical observation, and the results are by no means uninteresting.

This reviewer makes the curious statement that certain genera, " possibly from the same bed, may well be taken to be individual variations of one species." This is one of those statements made hurriedly, without due consideration of the consequences involved. For what is one bed ? Is it a deposit of one foot in thickness, or of two hundred feet ? A bed of one foot in thickness may consist of two similar matrices cemented together, which give evidence, the result of detailed palæontological work, that the lower portion was deposited 20 or 30 hemeræ earlier than the upper part. Or a bed a foot thick may be the condensed representative of various beds of different lithic character some hundreds of feet in thickness. Or a bed of 200 feet may be of similar lithic character throughout.

As I have often stated and illustrated by comparison of species in thin and thick deposits, the fact that in a thin bed species lie side by side is no evidence of their contemporaneity. That can only be ascertained by tracing the species of the thin bed laterally into other districts where the deposits are thick, or by faunal analyses of many localities. Until that be done, there can be no proof that even the thinnest bed is a deposit of one date. This is why in my chronological work I urge so strongly that for recording purposes it is advisable to record only actual facts, to employ many names rather than few ; because it is incorrect to say that the stratum of fossil A occurs at a locality where there is no fossil A, but only fossil B, even though at other localities fossils A and B lie in the same bed. But this has been the practice hitherto, with resulting mistakes.

My present use of two or more names instead of one is not to be taken as a positive assertion that there are two or three anisochronous hemeræ instead of one, even though the names be placed in sequence from necessity of writing. Rather, it is to be read as calling attention to the necessity of recording actual facts instead of surmises, to discrepancies disclosed by faunal analyses and to the point that the use of one name is not in accordance with the evidence : it lacks proof, and really begs the question.

To see how wrong is the doctrine that occurrence or non-occurrence in a bed is to be the deciding factor as to whether differing forms are to be regarded as varieties or species or genera, two deposits, A thin, and B thick, may be taken : they cover large areas and may be widely distant from one another. If the reviewer studied deposit A he would call the different fossils therein, which had some superficial similarity, merely varieties, because they lay together in one bed ; but if he studied deposit B he would say that as the different forms, really the same forms as those of locality A, occurred in widely separated beds they must be different species or even different genera. The position is quite untenable. Only by noting the discrepancies between forms of superficial similarity in the thin deposit of A, and by giving names to mark those discrepancies, is it possible to follow the different forms into the thick deposit of B, to find them there occupying, not positions side by side, but separate positions at top, middle and bottom, characterized possibly by quite different matrices. But even if the matrix of the thick deposit be the same throughout, it is obvious that in such a bed the species at the top, middle and bottom are not contemporaneous.

My critic has strange views of nomenclature when he claims that *Ammonites bisulcatus* d'Orbigny is to be taken as lectotype of the genus *Ammonites*. *A. bisulcatus*, d'Orbigny, dates from the middle of the 19th century; *Ammonites*, Bruguière, dates from the end of the 18th century. The lectotype of Bruguière's genus must be selected from one of Bruguière's examples, not from a figured shell without existence till fifty years later. It is like saying that the new mould from which a vessel of the 19th century was cast can be the mould (the type) from which a vessel of the 18th century was made. A 19th century mould can be the type of a good or a bad imitation of an 18th century vessel; d'Orbigny's *A. bisulcatus* is a bad imitation of Bruguière's *A. bisulcatus*; but however good or bad, it cannot be the type of Bruguière's genus. A 19th century mould cannot possibly have been used as the type for an 18th century vessel; but the reverse is quite possible. This common-sense view is recognized in the nomenclatorial rule which insists that a lectotype must be chosen from an author's original syntypes. Meek, Invert. Cret. .. Foss. .. Miss. (in Hayden, U.S. Geol. Surv., IX, 1876), pp. 445, 446, whom my critic cites, says nothing at all of *A. bisulcatus* d'Orbigny, but rightly places, as lectotype of *Ammonites*, *A. bisulcatus* Bruguière. This, however, covers two species, so that further selection was necessary, as shown in T.A. IV, Pls. CXXXI A, CCCXCII, p. 56.

My critic thinks that there is an error in taking *Am. falcifer* instead of *Am. serpentinus* for genotype of *Harpoceras*. This is all explained in T.A. I (1909), *i*. It is a case of an indicated type—indicated in the name. *Harpoceras* was proposed for the Falciferi, named from *Am. falcifer*. *Harpoceras* from *harpe*, sickle = *falx*, sickle, whence *falcifer*, sickle-bearer.

In regard to *Am. serpentinus*, there is this to be said: most writers of the later half of the 19th century meant by *Am. serpentinus* the species so called by d'Orbigny, which is *Am. falcifer*, or very near thereto. So the result is much the same.

Appreciation

The adoption, by other workers, of the author's methods, particularly of those used in Type Ammonites, may be regarded as approval, indicating that the author's work makes for the better understanding of the subject. Dr. Spath, in his Monograph of the Ammonoidea of the Gault, (Pal. Soc.), 1923, and in other recent papers, (Exc. Folkestone; Proc. Geol. Assoc. XXXIV, 1923, 70; Gault; App. II, Summ. Progr.: Mem. Geol. Surv. 1922 (1923), 139), has adopted the author's method of giving zoological names to the chronological Ages (T.A. III, p. 6, 1922), and has followed the author's multidivisional plan in regard to various smaller parts of such Ages. He has also listed and employed in his descriptions the technical terminology, the main of which was elaborated by the author; he has followed the method of giving proportions suggested in T.A. II, p. viii, and appears to have become a convert to the author's doctrine of the chronological significance of faunal dissimilarity.

In regard to his Ages and their subdivision, Dr. Spath has mixed chronological and stratigraphical terms. Age is the chronological term, but he employs for its division, Zone, which is stratigraphical, and is the subdivision of a stage: the subdivision of an Age is Hemera.

One interesting point comes out in a comparison of these Ages and Zones [Hemeræ] as applied to the Gault (Mon. Amm. Gault, p. 4). Dr. Spath deals with strata which are, in the Folkestone neighbourhood, about 130 feet in thickness—for contemporaneous strata he gives a thickness of about 120 feet—and he divides the time taken for such thickness of deposit into 4 Ages and 14 Zones [Hemeræ]. This Gault thickness of deposit is about one-half that of the Cotteswold Sands, which, at present, are dated as 1 Age and 2, perhaps 3 Hemeræ: my "minute subdivisions," as critics call them. This Gault thickness, however, may better be compared with a clay deposit. It is about one-tenth of the thickness of the Kimmeridge Clay of Dorset (J. Pringle, App. I, Summ. Progr. Mem., Geol. Surv. 1922 (1923), 133).

The Kimmeridgian beds of England I have dated as being deposited during 6 Ages and 20 hemeræ, or, taking the similar developments of beds for Great Britain, into 6 Ages and 24 hemeræ. On the basis of the stratal thickness of the Gault there should have been 40 Ages and 140 hemeræ for Kimmeridgian beds.

Three suppositions may be made: 1, the Gault at Folkestone is a very condensed deposit, and accumulated very slowly in comparison with Kimmeridge Clay-beds, yet the Kimmeridge Clay very incompletely represents the full development of contemporaneous strata: these I have, however, only divided into 7 Ages and 44 hemeræ; 2, my demands in the matter of subdivision, which have been thought very extravagant, are really exceedingly moderate; or 3, the thickness of strata is no criterion by which to judge of the requirements in the way of chronological division: to say "minute subdivision" only displays lack of knowledge of stratal development.

For technical terms, Dr. Spath rightly pleads definiteness and brevity as justification: to these, however, may be added, intelligibility to those whose native language is not that in which a memoir is written. True technical terms, based on the classical languages, would be nearly the same in all tongues, and are as necessary as the rule that specific names must be classical: for then there is not a term differing in each tongue for a given feature, but one universally understood term. Thus descriptions become intelligible to those who may know little or nothing of the native language of a writer.

Identification of Ammonites

This study, since its commencement, has shown considerable advance in making the identification of Ammonites more positive. In the first volume no proportions were given, because, owing sometimes to the rapid change in shape of a specimen, their value seemed doubtful; in the second volume proportions taken in the main only at one place were given: they were seen to be useful for the identifications of types and for comparison of species of similar size; in the third volume proportions at more than one point were recorded frequently; in the fourth volume proportions at two points became almost the rule; in the fifth volume proportions at only a single point have disappeared. Now it is proposed to show how such proportions at one point are nearly useless, but proportions taken at more than one point—three points almost imperative in excentrumbilicate shells—can become effective checks in the identification of species, as well as disclosing interesting evolutionary data when reduced to graphs, as advocated by Professor H. H. Swinnerton (Geol. Mag., LVIII, 1921, 357).

A few words on the method of taking proportions at more than one point may be useful.

One method, especially applicable to Ammonites of some size, is to take the second proportions at about half a whorl back. This gives positive measurements. But in most cases more than this is required. In some evolute shells, or in some broken shells, or in specimens cut through the middle, it is possible to take direct measures at various points.

It is remarkable how often the major radius is 57 per cent. of the diameter, which means that the minor radius is 43 per cent. When there is reason to think that such is the case, measurement from the centre to the point of emergence of the last whorl, on the venter, gives 57 per cent. of the diameter. But when there is reason to suppose, either from slow coiling (polygyral) condition or from rapid increase (oligogyral) that the major radius is in the first case below 57 per cent., or in the second case above it, it is possible to check the major radius percentage in various ways.

In some involute specimens measures can be obtained with fair accuracy by noting the position of the emergent venter with regard to some feature of ornament or of suture-line, and, provided that the coiling is regular, not excentrumbilicate, following backwards for half a whorl the line so given. But in other involute shells further estimation has to be employed for the diameter a whole whorl back.

The actual diameter can be taken at two places—at the end of the whorl and about half-a-whorl back. The major radius can be measured at each of these points, and its percentage to the diameter can be ascertained. If, as is the case in oligogyral shells, the percentage is increasing with increase of diameter, it is easy by the graph-method to ascertain what should be the percentage of the radius at one whole whorl from the end.

Smaller specimens, preferably of the same or allied species, but at any rate specimens of the same style of coiling, may be used as checks. When the major radius at the end of the whorl of a small example is the same as that at about the end of the penultimate whorl of the larger specimen, the actual diameter of the smaller specimen will check the estimated diameter of the larger example at the end of the penultimate whorl. A whole series of checks may thus be arranged, particularly useful for ascertaining whether a small specimen agrees in proportions with a larger one.

The major radius being, say, 57 per cent., the minor radius is 43 per cent. Converting the minor into the major radius will give, on the slide-rule, the diameter at half-a-whorl back, and, the operation being repeated, the diameter a whole whorl back, and so on. The operation being reversed will give diameters at half-a-whorl and a whorl forward, and so on. These are useful operations for checking diameters and for obtaining other details. The latter operation, for instance, is the method used for estimating maximum size of an incomplete specimen, based on the length of body-chamber in allied species. Also, when the mark of coiling is continued on the last whorl, the proportion of umbilication at a larger size can be estimated.

To show how the proportions ascertained by such methods may be used in graph-plotting, the following diagrams have been prepared.

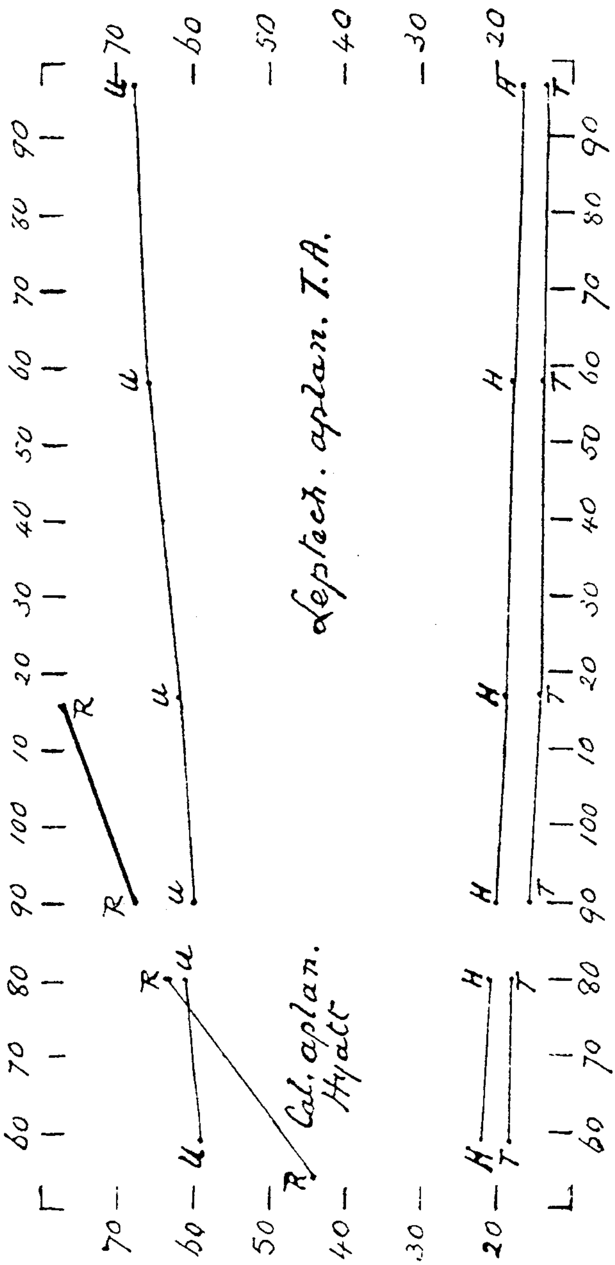


Fig. 1. LEPTECHIOCERAS

In them H means height (or breadth) of whorl, T, thickness, U, umbilication—these are expressed in percentages, the vertical figures, of the diameter, the horizontal figures; while R is the number of ribs expressed actually. In some cases, not to overcrowd the diagrams, only certain of the proportions have been plotted for comparison.

Fig. 1, p. 15, shows the method of comparing a large specimen with a figure of a smaller example. The agreement between the graphs of the figure and of the specimen are so close as to favour identification: the only discrepancy is in the thickness. But as the proportions of the smaller example are from a drawing, in which a very slight increase of thickness is easily made, little stress need be laid on this. The details used are given below:—

I, Genus *LEPTECHIOCERAS*

1. Caloceras aplanatum, Hyatt, Gen. Ariet., 1889, pp. 146, 147; Figs. 23, 24; Holotype;
   F. 59, 22, 18, 59; 44 ribs; 80, 21, 17·5, 61; 63 ribs.
2. Leptechioceras aplanatum, T.A. Pl. CDLXXXII;
   S. 90, 20, 15·5, 60; 68 ribs; 117, 19, 14·5, 62; 77 ribs;
   S. 168, 18, 14, 66; 197, 17, 13·5, 68.

Fig. 2, p. 17, is constructed from various species of *Goliathiceras*, according to the following details:—

II, Genus *GOLIATHICERAS*

1. G. ammonoides, T.A. CXXXIIA, B;
   F. 150, —, 67, —; S. 205, —, 76, —.
2. G. ammonoides, T.A. CXXXIIC;
   S. 43, —, 50, —; 81, —, 54, —.
3. G. capax, T.A. CCCXLIX;
   S. 163, —, 65, —; 231, —, 54, —.
4. G. galeatum, T.A. CLVI;
   S. 41, —, 58, —; 81, —, 71, —.
5. G. microtrypa, T.A. CCCLXXX;
   S. 116, —, 65, —; 192, —, 67, —.

Fig. 2 illustrates the agreement between two different-sized specimens of *Goliathiceras ammonoides*, the differences between various species of *Goliathiceras* and also exhibits the phenomena of tachygenesis or recapitulation of characters at an earlier age, as well as cyclical development of characters. For *G. ammonoides* is the most umbilicate, but it tends to close up the umbilicus: also, it steadily increases in thickness; *G. galeatum* attains to a smaller umbilicus and greater thickness at a much smaller diameter; *G. microtrypa* is the least umbilicate, and has nearly attained to the top of the arch so far as thickness goes, while *G. capax* has passed the top of the arch and is declining in thickness, while it is again opening out its umbilicus, returning towards the umbilication of *G. ammonoides*.

So these species can be arranged in their natural sequence, forming an arch, a, b, c, d, of the developmental cycle, both in umbilication and in thickness, as under:

c. *G. microtrypa*

b. *G. galeatum*

a. *G. ammonoides* d. *G. capax*

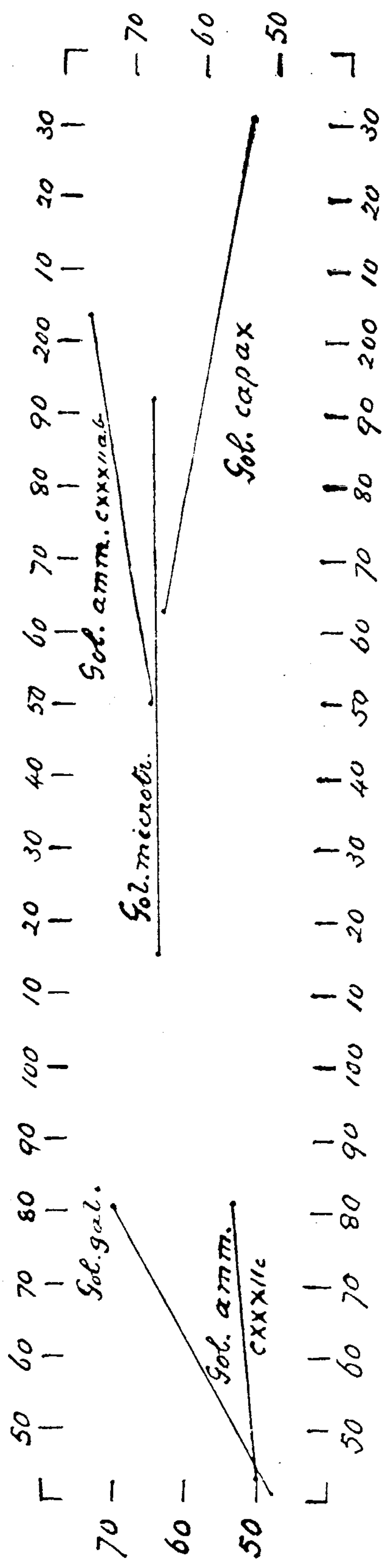


Fig. 2, Goliathiceras

Fig. 3, TRANSVERSAL HOMŒOMORPHS

Fig. 3, below, shows a method of making a comparison of two similar-looking species—two species which show transversal homœomorphy, for their proportions cross—are similar—at points between 35 and 45 mm. diameter. But if the proportions of *Polysphinctites replictus* were to be produced, they would not accord with those of *Asphinctites recinctus*. On the other hand, the proportions of the latter continued backwards do not at all fall into the lines of those of the former. Yet there is a remarkable superficial likeness in the two species, even to the suture-line ; but in *Asphinctites* the absence of constrictions, so marked a feature in *Polysphinctites*, is noticeable. This graph is constructed from the details given below.

III, *TRANSVERSAL HOMŒOMORPHS*

1. Polysphinctites replictus, T.A. CCCLIX ;
   S. 26·5, 41, 45, 36 ; 43, 32·5, 31, 37.
2. Asphinctites recinctus, T.A. CDLXXXIV ;
   S. 38, 37, 34, 32 ; 50, —, —, 40 ; 64, 29·5, 25, 47.

Fig. 3, TRANSVERSAL HOMŒOMORPHS

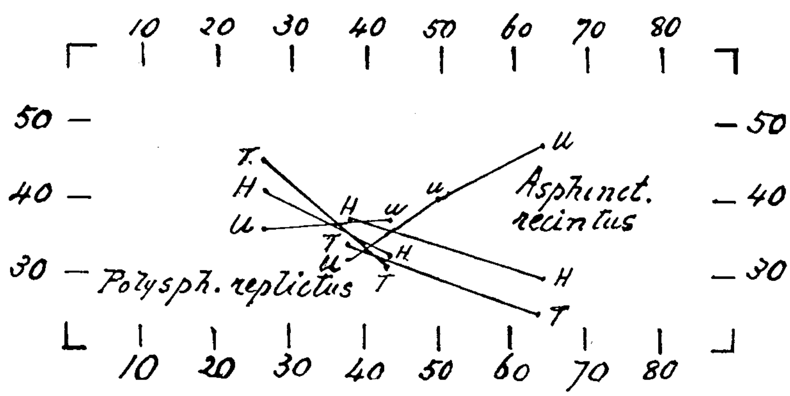
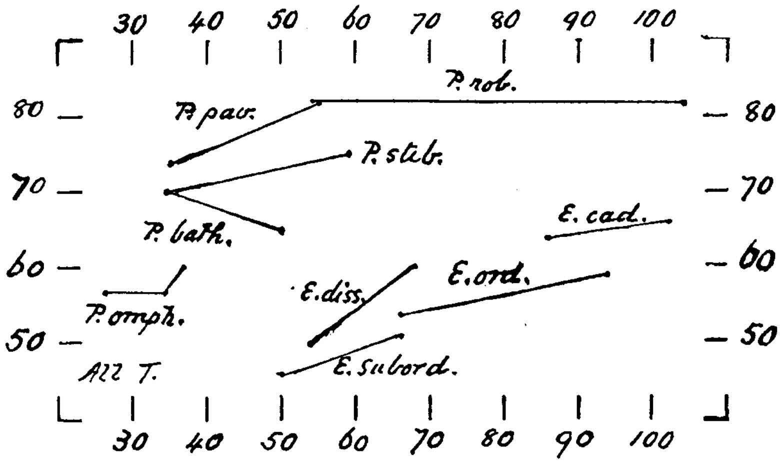


Fig. 4, p. 19, illustrates how graph-plotting brings out the differences between two allied genera in regard to thickness, and also the differences between species of those genera in the same character. If a diagonal be drawn across the graph from 40 to 80 per cent., it is seen that all the species of *Eboraciceras* fall well below this line, while all the species of *Pavloviceras* come well above it.

Fig. 4, PAVLOVICERAS, EBORACICERAS



Details for this graph are as follow:—

IV, *EBORACICERAS, PAVLOVICERAS*

1. Eboraciceras cadiforme, T.A. CDV;
   S. 86, —, 64, —; 102, —, 66, —.
2. Eboraciceras dissimile, T.A. CXVIII;
   F. 54, —, 50, —; 68, —, 60, —. By an oversight the proportions were taken from the figures instead of copied from the text; this reads:
   [S.] 57, —, 52, —; 76, —, (58 ?), —.
3. Eboraciceras ordinarium, T.A. CLXXI;
   S. 66, —, 54, —; 94, —, 59, —.
4. Eboraciceras subordinarium, T.A. CLXXII;
   S. 50, —, 46, —; 66, —, 51, —.
5. Pavloviceras bathyomphalum, T.A. CXCVI;
   S. 34, —, 70, —; 50, —, 65 ? —.
6. Pavloviceras omphaloides, T.A. CXCV;
   S. 26, —, 57, —; 34·5, —, 57, —; 36, —, 60, —.
7. Pavloviceras pavlowi, T.A. CLXX;
   S. 35, — 74, —; 55, —, 82, —.
8. Pavloviceras roberti, T.A., Vol. III, p. 19;
   F. 54, — 82, —; 104, — 82, —.
9. Pavloviceras stibarum, T.A. CXCVII;
   S. 34, —, 70, —; 59, —, 75, —.

The species of *Eboraciceras* can be placed in their developmental order, *E. subordinarium, E. ordinarium, E. dissimile, E. cadifome*, where increase of thickness ascends till *E. cadiforme* shows a position nearly on top of the arch. This developmental increase of thickness coincides with gradual umbilical inclusion and with decline of costation—recapitulation at a smaller size—an earlier period of life, perhaps—of these

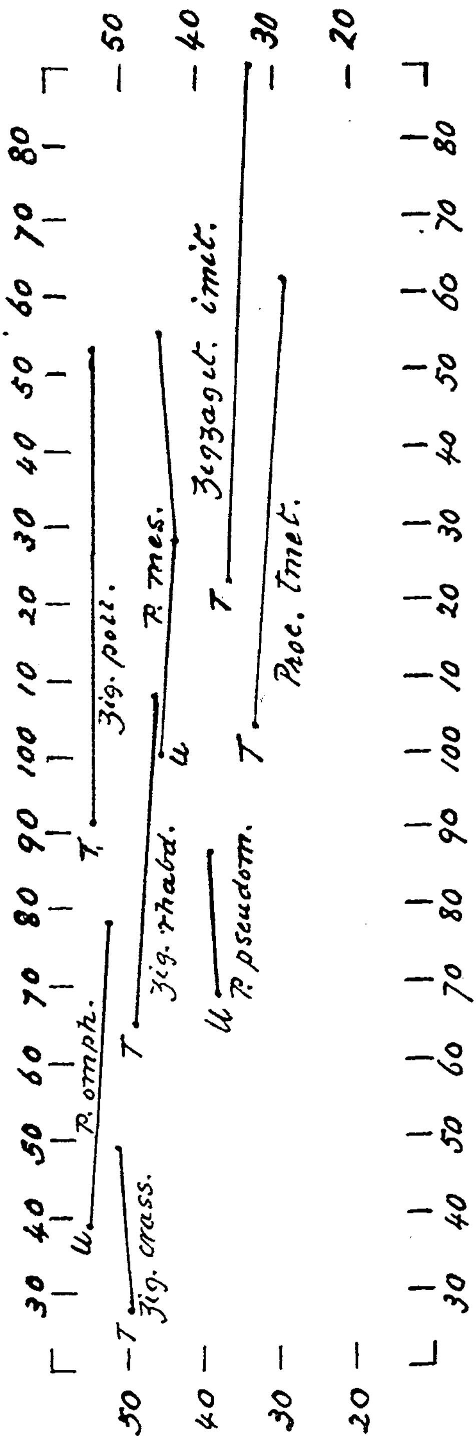


Fig. 5, ZIGZAGICERAS *et a.*

characters. In regard to thickness, no one of these illustrated species of *Eboraciceras* is on the down grade ; but such a species is to be expected, as well as a species which is stronger on the up grade than *E. dissimile.* Such a species, if it be found complete, might be expected to show down grade in thickness, but commencing it at a diameter larger than that attained by *E. cadiforme.*

The species of *Pavloviceras* can be arranged according to thickness—ascending (increasing), *P. omphaloides, P. stibarum, P. pavlowi* ; on top of arch, stationary, *P. roberti* ; on the down grade, *P. bathyomphalum.* Possibly a larger example of *P. stibarum* might show that it should be placed after *P. roberti.* But the graph certainly illustrates how larger and smaller specimens of these species could be detected, and where the proportions of new species might be expected to fall.

Fig. 5, p. 20, is another trial of graph-plotting of allied species and genera. Two genera, *Zigzagites* and *Procerites*, distinguished from one another by considerable difference in suture-line development, fall together below *Zigzagiceras.* In this genus *Z. crassizigzag* could, by its graph, be the young stage of *Z. pollubrum* ; but the too-early decline of its primary costæ forbids such connection.

Into this graph have been plotted umbilical details of *Prorsisphinctes* showing how the species are distinguishable by these proportions. The widest umbilicus is found in *P. omphalicus*, but it is contracting ; more contraction is shown in *P. meseres*, but then expansion comes ; at a smaller size this character appears in *P. pseudomartinsi.*

The umbilication could be plotted further back on the basis of 57 : 43 explained above, p. 14 ; it would, even if not quite exact, give the same basis for each species for their comparison. An umbilical graph for *P. pseudomartinsi* parallel to that of *P. omphalicus* might be expected between 40 and 50 mm. diameter.

Details of Fig. 5 are below.

VA, FAMILY *ZIGZAGICERATIDÆ*

1. Procerites tmetolobus, T.A. CDXVI ;
   S. 104, —, 33, — ; 162, —, 29, —.
2. Zigzagiceras crassizigzag, T.A. CCCXXXV ;
   S. 28, —, 50, — ; 49, —, 51, —.
3. Zigzagiceras pollubrum, T.A. CCLIX ;
   S. 91, —, 54, — ; 153, —, 54, —.
4. Zigzagiceras rhabdoucus, T.A. CCC ;
   S. 65, —, 49, — ; 108, —, 46, —.
5. Zigzagites imitator, T.A. CCCI ;
   S. 123, —, 36, — ; 190, —, 33, —.

Fig. VB, *PRORSISPHINCTES*

1. P. meseres, T.A. CDXLVII ;
   S. 100, —, —, 45 ; F. 128, —, —, 43 ; S. 155, —, —, 45.
2. P. omphalicus, T.A. CCCXXVI ;
   S. 39, —, —, 55 ; 78, —, —, 52.
3. P. pseudomartinsi, T.A. CC ;
   F. 68, —, —, 38 ; S. 87, —, —, 38·5.

Fig. 6, below, is graph-plotting of genera and species of three families. *Cadoceras* shows two species well on the up grade; *Pachyceras*, which has sometimes been mistaken for *Cadoceras*, is on the down grade. All the Macrocephalitidæ are on the down grade, with the exception of *Pleurocephalites folliformis*, which is on the top of the arch—a larger example of it should show down grade. But the young examples and biologically earlier species of *Macrocephaliceras* should be on the up grade—similar, but even steeper than *Cadoceras sublæve*.

Species of two genera, *Macrocephalites verus* and *Tmetokephalites septifer* show very close approximation of their thickness-graphs. Here difference of suture-line comes in: that of *T. septifer* is much more elaborate, much more incised, than that of *M. verus*—L1 of the former shows some 12 per cent. greater length than that of the latter (see details in list, p. 23).

Similar approximation in thickness-graph is shown by *Dolikephalites dolius* and *Tmetokephalites bathytmetus*. Here again suture-line details are a distinguishing feature. And as *Tmetokephalites* belongs to the clay above the Cornbrash or to the Kellaways Clay, on the evidence of *T. septifer*, while *Dolikephalites* occurs much earlier—in the Cornbrash—the difference of suture-line becomes a means of distinguishing two genera of different dates, whose approximation in thickness is only an incident which may often be expected in sequential series of a family passing through parallel phases.

Fig. VI, MACROCEPHALITIDÆ *et a.*

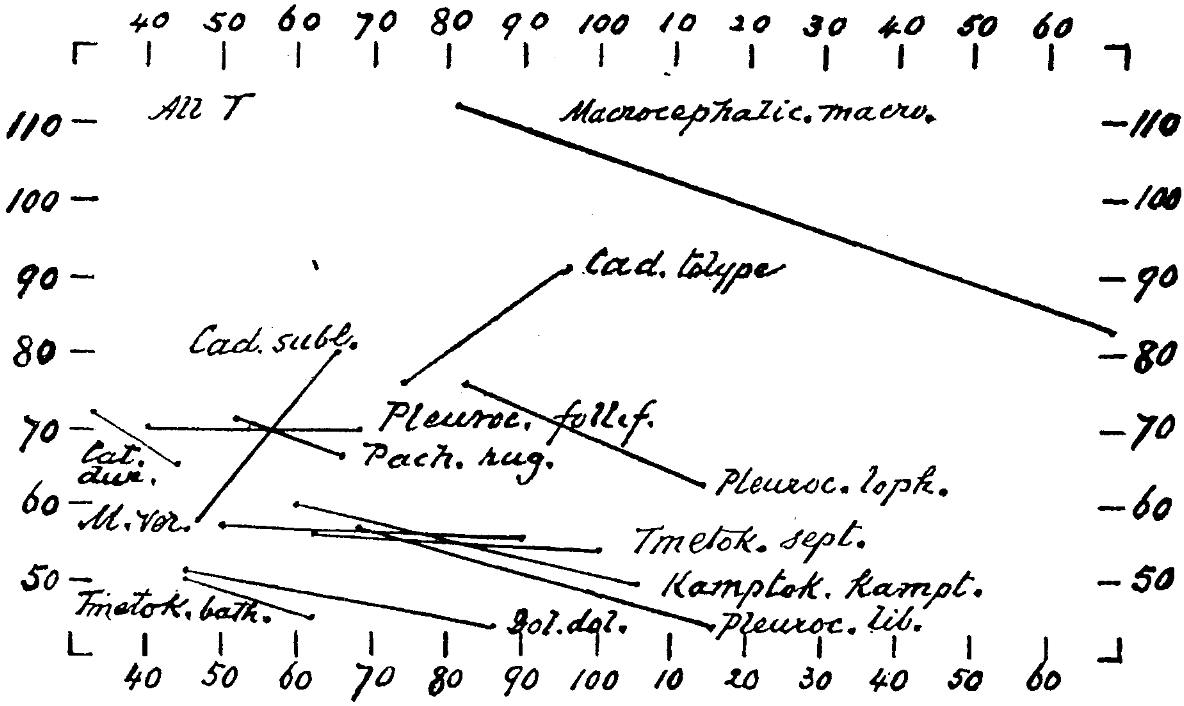


Fig. 6 is constructed from the following details:

VIA, FAMILY *MACROCEPHALITIDÆ*

1. Catacephalites durus, T.A. CCLXXXIII;
   S. 33, —, 72, —; 44, —, 65, —.
2. Dolikephalites dolius, T.A. CCCLXXII;
   S. 45, —, 51, —; 86, —, 44, —.
3. Kamptokephalites kamptus, T.A. CCCXLVII;
   S. 60, — 60, —; 105, —, 49·5, —.
4. Macrocephaliceras macrocephalum, T.A. CCCXIII;
   S. 81, —, 112, —; 168, —, 84, —.
5. Macrocephalites verus, T.A. CCCXXXIV;
   S. 50, —, 57, —; 90, —, 55, —; L1, 71 per cent of 15 mm. whorl-breadth (F).
6. Pleurocephalites folliformis, T.A. CCCXLVIII;
   S. 40, —, 70, —; 68, —, 70, —.
7. Pleurocephalites **liberalis**, nov. "*Ammonites macrocephalus*, Chippenham, [Wiltshire], Oxford Clay"; Geol. Survey Coll. 30565; Macrocephalitan, *Pleurocephalites*; Holotype;
   S. 68, 43, 57, (20?); 115, 45, c.44, 21.
8. Pleurocephalites lophopleurus, T.A. CCLXXXIV;
   S. 82, —, 76, —; 114, —, 63, —.
9. Tmetokephalites bathytmetus, T.A. CCCLXXIII;
   S. 44, —, 50, —; 62, —, 45, —; L1, 83 per cent. of 24 mm. whorl-breadth (F).
10. Tmetokephalites septifer, T.A. CDXXXIII;
   S. 62, —, 56, —; 100, —, 54, —; L1, 83 per cent. of 49 mm. whorl-breadth (F).

VI B, Genus *CADOCERAS*

1. Cadoceras sublæve, T.A. CCLXXV;
   S. 47, —, 58, —; 65, —, 80, —.
2. Cadoceras tolype, T.A. CDVI;
   S. 74, —, 76, —; 96, —, 91, —.

VI C, Genus *PACHYCERAS*

1. Pachyceras rugosum, T.A. CXV;
   F. 52, —, 71, —; S. 66, —, 66, —.

It would be interesting and it is tempting to continue these comparisons by graph-plotting; but expense and space forbid. Enough has been done to show the principle and how it works. The student of Ammonoids should keep the ruled graph-paper by him, so that with the details which are given in the legends of the plates, or are otherwise available, he can plot from specimens and pictures for identification and comparison. Differences which the eye may not readily grasp from pictures will be brought out with startling clearness by plotting—a great advantage when there is any sign of that phenomenon, a lack of appreciation of depicted form, which might almost be called form-blindness.

It should be comparatively easy to note either agreement or differences between two specimens lying side by side ; it may be difficult to see them between a specimen and a picture ; it is more difficult to grasp them as between two pictures, especially if they depict specimens of different natural size ; while further difficulty is experienced in comparing pictures of specimens of which one may be greatly enlarged or reduced. But such difficulties are overcome when actual proportions and other details are plotted on graphs : the method makes identification more a matter of fact and less a matter of opinion. One trouble may present itself—that owing to mischance figures may be given incorrectly, as in the following case :

Corrections

In Pl. CDLXIXB, *Strigites strigifer*, Paratype, for ' × 0· 2 ' read ' × 2.'

In Pl. CDLXXXII, *Leptechioceras aplanatum*, bottom line, for ' Holotype ' read ' Plesiotype.'

In Pl. CDLXXXVI, line 2, for ' III, 2 ' read III, 4 '

Ammonites subtensis (*Peltoceras subtense*) Y.T.A. II, Pls. XCIXA, B for ' Lectotype ' read ' Metatype ' ; Pl. XCIX B for ' Syntype ' read ' Holotype ' on the following evidence :—

Leckenby's Kell. Rock paper (Q.J.G.S., XV, 1859, p. 4) was reprinted in the Scarborough Philosophical and Archæological Society 27th Report, for the year 1858, Scarborough, 1859 (pp. 16-29, Pls. I—III), with errata and corrigenda. In the copy seen are some MS. notes by the author. On p. 22, against ' 10. *Ammonites arduennensis* (*Am. subtensis* Bean),' is this MS. note : " My specimens (obtained since the above was written) shew that this species is the young condition of *Am. murrayanus*—the slender and delicate ribs becoming coarser and more distant as the whorls increase, and finally tuberculated as in *A. murrayanus*." The large specimen depicted (Y.T.A., XCIX A, XCIX B, 1) cannot be chosen as lectotype, as it did not form part of the author's original series : in fact, the note implies that the small specimen (Y.T.A., XCIX B, 2, 3) was the sole example described, and is, therefore, the holotype.

Ammonite Names

Microceras, Hyatt, 1867, (Foss. Ceph. ; Bull. Mus. Comp. Zool., No. 5, p. 80). The name was abandoned by Hyatt because it only differed by one letter from some previous generic terms ; but this rule has for some time been obsolete. No type was cited : the many species mentioned are syntypes. Now taken as genolectotype species, *Microceras confusum* ; Hyatt. For the trivial name he cites *Am. confusus*, Quenstedt (Jura, pl. 75 [xv], figs. 8, 9). It is evident from the localities that he mentions " Lansdown Station, near Cheltenham, and Gloucester," as well as from his generic diagnosis that his specimens are not *Am. confusus*, but belong to the group of *Am. subplanicosta*, Oppel, so abundant at the localities cited. Hyatt's labelled types in the Museum of Comparative Zoology, Boston, U.S.A., will be genosyntype specimens, and one of these will have to be chosen as genolectotype specimen.

Oppel's syntypes of *Am. subplanicosta* came from Wurtemberg.

Professor Dacqué was not able to find them, but he kindly sent two of Oppel's idiotypes from "Lower Lias, Gloucestershire." The largest of these has been prepared for figuring in this work. Other species of the genus are *Am. vitreus*, Simpson, and *Turrilites coynarti*, d'Orbigny.

BINATISPHINCTES, S. Buckman, 1921 (T.A., III, Legend of Pl. CCLXIA). *Am. comptoni*, Pratt, (T.A. CDLXXXV) has been placed in this genus with a query, because there is no suture-line to prove or disprove. But, if the identification be correct, it suggests that the species of *Binatisphinctes* from the Yorkshire Kelloway Rock may have been dated too late. This deposit shows fauna of many hemeræ: it is quite possible that some of its fauna synchronize with some of those from the Christian-Malford Clays. But, so far, from Yorkshire there is a lack of evidence for the Kosmoceratids special to the Christian-Malford Clays. These clays, however, are obviously of more than one date.

CLYDONICERAS, Blake, 1905, (Fauna Cornbrash, Pal. Soc., p. 53). Type cited thus, p. 54, "Ex. *C. discus*." Therefore the genoholotype is *Clydoniceras discus*, figured by Blake in Pl. VI, fig. 1, of his memoir.

HARPOCERATIDARUM, Pompeckj, 1906, (Oxynot. du Sinémurien; Comm. Serv. Géol. Portugal, VI, 260). No definite type selected. Group of *Am. discus* cited, p. 260; but in p. 251, where the group of *Am. discus* is discussed, the form is cited thus, "*Amm. discus* (Sow.), Oppel . . Palæontologische Mitteilungen 1862, p. 146, pl. XLVII, fig. 1." This specimen is, therefore, the genoholotype of Pompeckj's genus: it differs in proportions, venter, shape of aperture and suture-line from *Clydoniceras discus*; Blake. The suture-line is more definitely lobate, and agrees with that of a specimen now to be discussed.

Ammonites discus; Leckenby, 1863, (Suppl. Mon. G.O. Moll. 4; XLI, 8, 8a). In the dispersal of the geological collection of the Royal Agricultural College, Cirencester, Gloucestershire, an Ammonite was obtained by Professor H. H. Swinnerton, University College, Nottingham, which is, according to the following evidence, the original of Lycett's figures. It is marked in ink, *A. Hollandi*, J.B. [J. Buckman]."

The first mention of this Ammonite is by my father, James Buckman (Oolites; Q.J.G.S., XIV, 1858, 117, footnote)—" a single individual of a new Ammonite [from the Bradford clay of Cirencester] . . found by John Coleman, Esq., now Professor of Agriculture, . . . Royal Agricultural College."

In 1863, as above noted, it was figured and described by Lycett. In the explanation of his figure he says "Forest Marble. Slightly reduced." In his text he remarks: "In the young state, when the diameter does not exceed three inches, the sides are ornamented with regular distant, depressed, flexuose costæ. . . The fine specimen selected for our illustration exhibits the septa, and also some traces of the falciform costæ proper to the young shell. I am obliged to Mr. [S. P.] Woodward, of the British Museum, for information respecting it, and also for a careful drawing . . . ; the specimen was obtained in the Bradford Clay of the Tetbury Road Railway Station, near Cirencester, by Professor Coleman, of the Royal Agricultural College."

S. P. Woodward was Professor at the College before he obtained the post at the British Museum. He made a fine collection of Bradford-Clay fossils: his analysis of them is quoted by J. Buckman, op. cit., p. 117. This Ammonite was an addition thereto, so interesting to Woodward as a unique example that he made a sketch of it. For such sketch he, presumably, marked some suture-lines. In the specimen inscribed *A. hollandi* portions of suture-lines near the truncated end of the whorl were marked, first in pencil, and then in ink. In the marking there are certain mistakes—one especially noticeable: that, where two suture-lines come into contact, at the inner edge of L1, the marking goes off to the saddle (S1) of the preceding suture-line, and thence follows that. For the purpose of photographing *A. hollandi*, it was necessary to emphasize the original marking with indian ink, and to paint in the loculus with white paint. Pl. D shows that the dark line, presumably traced originally by Woodward, goes beyond the white loculus till the inner edge of L1, and then goes behind it. Exactly this mistake is seen in Lycett's figure.

Lycett's "slightly reduced" is an error: the figure is exactly one-half of the size of *A. hollandi*. This is confirmed by Lycett's remarks about the young shell of three inches diameter: such would approximately be the diameter of *A. hollandi* at the beginning of the last whorl, where are shown the "flexuose costæ" obscurely, and also a sharp carina rising from a slightly concavifastigate periphery. The proportions of Lycett's figures are those of *A. hollandi*. Measurements at various points of the marked suture-lines show that they are situated from the end of the whorl just one-half the distance of those of *A. hollandi* as originally marked.

Further evidences of identity are that in Lycett's figure the inner portion of the truncated end is shown curving backwards and the umbilicus is depicted as excentrumbilicate for about the last quarter-volution: both characters of *A. hollandi*.

It may, perhaps, be asked why my father, in giving the fossil a personal name, should not have applied that of its discoverer. It may be suggested that he had a particular wish to give the name of Holland. Edward Holland, of Dumbleton, Gloucestershire, took a prominent part in founding the Agricultural College. His cousin, Robert Holland, of Mobberley, Cheshire, was an early pupil at the College, keen on natural history. My father's paper mentioning this Bradford-Clay Ammonite was read in 1857 and published in 1858. Rather before the earlier date Robert Holland had married and, about the earlier date, had been able to act as host to my father at a critical time. Riding in the lanes of Cheshire, ostensibly following the hounds, my father successfully prosecuted his suit to his future wife—a suit interdicted by the lady's London parents, who had sent her to Cheshire, as being a place far away from Cirencester. My father married in 1858. Some quarter-of-a-century later, Robert Holland became my father-in-law.

Am. hollandi is particularly interesting as an ammonite from the Bradford Clay of England—possibly a unique example—and from its likeness to *Am. discus* of the Cornbrash. From *Am. discus* it is separated by what must be a very considerable time-interval; for the Forest Marble intervenes. This deposit, reckoned as consisting of the Hinton Sands, the Pickwick Beds and the Wychwood Beds, in descending order, may be estimated at over 100 feet in thickness—possibly very considerably more, if allowance be made for non-sequences.

Oppel (op. cit., Explan. Pl. XLVII, 1) says that his *Am. discus* comes from "Bath-Gruppe, Cornbrash oder Zone der *Terebratula lagenalis* oder des *Amm. aspidoides*." From this, and from his remarks about *Am. aspidoides*, it is evident that he is dealing with a very condensed deposit, which he thinks to be one bed: the one-bed difficulty has been already commented upon, see above, p. 11: this is a good opportunity to expose it by an actual case, *A. hollandi* having been discovered since p. 11 was printed.

Oppel's one bed contains fragments of faunas which belong to several Ages, possibly to seven—from Macrocephalitan down to Parkinsonian (see T.A., IV, 9, 10). His *Terebratula lagenalis* belongs to late Cornbrash (early Macrocephalitan), his *Am. aspidoides* to late Minchinhampton Beds (Oxyceritan); other elements that he mentions suggest much earlier Ages. But the *lagenalis-aspidoides* faunas are enough. How great a time-interval, marked by thickness of deposit, separates them may be shown in the following Table:—

TABLE I, OPPEL'S "CORNBRASH"

Fauna	*Deposit*	*Age*	*Thickness* (approximate) in feet
T. lagenalis; Oppel	CORNBRASH laid down during many hemeræ	Macrocephalitan } Clydoniceratan }	45
	FOREST MARBLE:— Hinton Sands, Pickwick Beds, Wychwood Beds	Clydoniceratan	100—150
[*Am. discus*; Oppel]	BRADFORD CLAY and associated beds, laid down during several hemeræ	Clydoniceratan	75
Am. aspidoides, Oppel	GREAT OOLITE (part):— Kemble Beds, Chedworth Beds, Minchinhampton Beds (upper part)	Oxyceritan	80—100

From this Table I it may be seen that some 300 to 400 feet of deposit separate the faunal elements which Oppel supposed to be contained in one bed. This thickness is possibly an under-estimate, a thickness which will be increased by fuller knowledge of the stratal and faunal constituents and by their more exact correlation.

A case similar to this example of strata from Great Oolite up to Cornbrash has already been noted—it concerns strata from Great Oolite down to Inferior Oolite (T.A. IV, 49). There one bed represented a thickness of strata estimated at about 500 feet. So that, putting these two cases together, it would seem that on the Continent one, or perhaps two, thin beds represent a stratal deposition which in England may be over 800 feet in thickness—and there is no certainty that these English rocks are anything like complete.

Some such fact as that the Continental strata from Parkinsonian to Macrocephalitan, and even later, are only isolated fragmentary deposits of no great thickness, would seem to account for Quenstedt having treated them as only a minor episode of the Braun Jura, and for the extraordinarily incorrect correlation tables of Bathonian strata put forward by Schlippe and by Steinmann. But this is a chronological matter to be treated later, in its due order. Meanwhile, it may be suggested that Oppel's *Am. discus* was a contemporary of *A. hollandi* and that the *hollandi* hemera of the Clydoniceratan Age fixes a rather important date in Jurassic Chronology.

What, however, was the stratal position of *Am. hollandi?* The matrix attached to one side of it, and spreading over the truncated end of the whorl, is certainly Bradford Clay—a cream-coloured, marly clay, containing many highly-polished oolite grains. In this matrix, or fixed to the specimen, are the following species of fossils, which Mr. J. W. Tutcher has kindly identified :—

" *Ostrea sowerbyi*, Lyc. Very common in Bradford Clay. I have a few specimens, not easily separated, from Cornbrash.

" *Serpula triangulata*, Sow. *S. tricarinata* is the commoner in the
" *Serpula tricarinata*, Sow. Bradford Clay. I have not collected either from higher beds.

" *Berenicea diluviana* (Lamx.). I have found it only in Bradford Clay, where it is certainly very common.

" *Cerithium* cf. *quadricinctum*, Goldf. *C. quadricinctum* does not appear to be recorded above the Forest Marble. I have not collected it.

" On the whole, the evidence of the attached fossils is against the Cornbrash, and in favour of the Bradford Clay position."

The Bradford-Clay matrix overspreads a side which has evidently suffered very considerably before the specimen was finally entombed—the side is much worn, excavated into considerable hollows, with a very broken-up surface. It may be argued, then, that the specimen is derived, that it is not contemporaneous with its Bradford-Clay matrix, that it lay at the base of the Bradford Clay of the Tetbury-Road section, and that the worn side, with holes, formed the upper side as the shell was finally deposited.

This is supported by the evidence of the matrix disclosed in the broken portion of the periphery, not far behind the aperture. It is further supported by the evidence of the attached organisms: they show that they attached themselves to what had already been made into a cast and had lost all its test before entombment in Bradford-Clay matrix.

The matrix disclosed in the break is not oolitic: it is a bluish sandstone, suggesting the strata described by Reynolds and Vaughan (Jur. S. Wales Line; Q.J.G.S., LVIII, 1902, 742-747) as Great-Oolite beds with Bradford Clay facies: strata which it is now proposed to distinguish as Acton-Turville Beds—their beds F, E2, E1, D, in descending order—with the idea that the matrix of *A. hollandi* seems to agree with that of E2. These Acton-Turville Beds, F—D, are nearly 50 feet in thickness.

So the deposit of the hemera *hollandi* may, perhaps, mark a date in the Acton-Turville Beds, which are, in part at any rate, earlier than the Tetbury-Road Beds—the Bradford Clay of Tetbury Road Station—and these, again, in part, are earlier than the Bradford-on-Avon Beds—the Bradford Clay of Bradford-on-Avon, Wiltshire. So a thickness of about 70 feet is obtained for Bradford Clay and associated beds, without counting other beds approximately of this date, but not wholly synchronous.

Harpoceratidarum typus, nom. nov. Holotype, *Am. discus* Oppel, 1862, Pal. Mitt. XLVII, 1.

Harpoceratidarum schlippei, nom. nov. Holotype, *Am. discus*; Schlippe, Fauna Bath.; Abh. geol. Specialk. Elsass-Lothr., VI, (4); 195; Pl. VIII, 1, 1a.

Harpoceratidarum hollandi, J. Buckman MS. sp., Holotype, Pl. D, (*A. discus*; Lycett).

Harpoceratidarum sp. *Ammonites discus* Guéranger, (Sur l'Am.

discus; Ann. Soc. Linn. Maine-et-Loire, VII, 1865; p. 185; Pls. I, II, 2). Non *A. discus*, Sow. Very similar to *H. hollandi*, but possibly another species, as, according to the author's figure, it reaches a much larger size without showing excentrumbilication, and, according to his description, has fine striæ in bundles. But the description is evidently a synthetolog—combining the characters of several specimens of the author's with those of Sowerby's *A. discus*, so that it is difficult to tell what characters rightly belong to his figured specimens.

The position of the specimen is notable: a bed from 1 to 0·25 metre thick, resting on compact limestone of Great Oolite and sometimes overlaid by lowest beds of Callovian. Fossils common to Bathonian and Callovian are found in the one bed.

Thus in the Sarthe a bed of about 3 feet in thickness represents, according to the fossils cited, fragments from Christian-Malford Clays down to Acton-Turville Beds, some hundreds of feet—see remarks above, pp. 26, 27.

Guéranger's fossil may well be synchronous with *H. hollandi*, if it be not actually the same species. It has the suture-line.

These species may be contrasted with *Clydoniceras discus* as under:

Genus *HARPOCERATIDARUM*

H. typus. Holotype, Oppel's figure;
F. 87, 52, 23, 2·9.
H. schlippei. From Schlippe's figure;
F. 90, 50, 29, 5.
H. hollandi. From the original of *A. discus*; Lycett;
S. 67, 57, 27, c. 8; 132, 57·5, 24, 6·8.
H. sp.; *Am. discus*. Guéranger's figure;
F. 170, 51·5, —, 7; max. c. 250.

Genus *CLYDONICERAS*

C. discus, J. Sowerby sp., Min. Conch. I, 1812, XII;
F. 100, 60, 12.5 [?], 0.
C. discus; Blake, 1905, VI, 1;
S. 66, 60, 22, 0?; 107, 60, 24, 0; size c. 113.

BENEDICTITES, nov. Genoholotype, *B. hochstetteri*, Oppel sp., in T.A. Pl. CXXIV. Distinct from *Clydoniceras* and *Harpoceratidarum* by the suture-line, particularly the two-pointed L1.

The reason for the name is that, in giving a blessing, Church Dignitaries hold up the first two fingers of the right hand, separated, to form a V. Cognate with this is the good luck supposed to be ensured by the finding of a horse-shoe, a U-form, and the blessing, the protection against evil, which the affixing of a horse-shoe to a building is expected to confer. But the precisians in regard to this belief assert that the good fortune, in the first case, can only come if the convexity of the horse-shoe point towards the finder and, in the second case, if the horse-shoe be so affixed that the ends project upwards, away from the ground. Other positions, they assert, are wrong, and would not bring good fortune.

The 'trussed-chicken' attitude is adopted by the females of savage tribes as a greeting to strangers or to the white man whom they wish to welcome. It is an example of the universal urge, shown also in the vegetable kingdom by plants when they exhibit their gaudy petals. The human race would, in their earliest attempts at delineation, represent the trussed-chicken attitude easily in a conventionalized form by drawing in soft ground the figure U. In hard stone the curved base would be difficult to form, and so the U would be converted into either V or into a three-sided oblong—⊔ : when inverted the Greek capital pi, Π

U, expanded, gives an arc, which was the sign on Roman tombstones for a female: expanded and half-inverted it becomes the crescent—the mascot symbol on the banner of some polygamous nations. The appearance of the crescent moon in the sky seemed to be heaven's special invitation to indulgence in the rites of the worship of Astaroth—a worship so strongly condemned by the puritanical Jawist priests; but just as strongly defended by the worshippers as bringing them good fortune in crops and herds.

The U-form in various phases was largely used as a sign of blessing or as a protection against the evil eye. In the form of horns or a half-moon it was worn as a mascot to avert dangers of travel or of war: it has the form of horns on the helmets of warriors; it appears as two wings on the helmet of Hermes. In the mountings of ships' bells and compasses it appears as two dolphins, a form also used, as a mere conventionalized decoration, on postage stamps.

The U, simple or conjoint, has become the basis of much decoration. The conjoint form or ω-shape (omega) finds its best expression in the *cavalli marini*—the silver ornaments worn on the person or hung in rooms in Italy: their special object being to ward off the evil eye—the middle branch frequently appears as the head and trunk of a female (Elworthy).

The head and tail pieces of books, sometimes very elaborate scroll-work decoration, show the U-form greatly multiplied, everted and inverted, often joined up in serpentine or ᔕ. Hence it is easy to understand that the sacred emblems of certain religions—serpent worship, cup-and-ring markings, are mere extensions of the U form; so are the volutes of Ionic columns.

U, V, simple or duplicated, ω, W, upright or inverted, enter into the grouping of pictorial art—unless some such arrangement of the subject matter be shown, the picture is said to be wanting in balance. The Japanese only have, in the main, broken free of this tradition.

V is reproduced as a sacred symbol in the bishop's mitre. In the form of a fish with open mouth it was part of the dress of the priests of the fish-god (W. Simpson).

V inverted forms part of the honour or possibly mascot of a wedding ceremony—the passing under an archway of crossed swords.

V inverted with a line for a base forms the Greek delta, Δ, which has also a feminine signification. In architecture it gave rise to the pyramid, which gives the delta shape from every aspect: it may have also given rise to the spire—at least, to the tetragonal or hexagonal one.

The pi form, Π, combined in fourfold, gives the very ancient and extremely lucky symbol of the swastika or fylfot. Combined in another way, it makes the Greek key. In architecture it appears as the twin towers of cathedrals, the pinnacles at each corner of a square tower, which give the form from any point of view; as the pinnacles at the corners of roofs; and, inverted, as the trilithons of Stonehenge.

So the ornamentations of architecture and the decorations on domestic and other articles, though they have no meaning for us now, and only appear from innate conservatism—the habit of copying—once had a very definite meaning: they were the symbols of a universally understood language—that of sex. They were, possibly, largely concerned with the beginnings of written communication.

Enough has been said to show why the figure of two extended and parted fingers or a horse-shoe is regarded as a blessing. So an ammonite with a superior lateral lobe in the form of a horse-shoe may suitably take the name of *Benedictites*.

The discovery of the example of *B. hochstetteri* resulted from the finding of *Harpoceratidarum hollandi*, Pl. D, see IV, 25. In his paper on the Oolites there cited my father quotes certain species of Ammonites as common to the Cornbrash and the Inferior Oolite, pp. 104, 122. What these Cornbrash species signified was a puzzle, in the solution of which Blake asked my help; but I could throw little light on it. Now the specimens found in the collection of the Royal Agricultural College, Cirencester, which, in the main, consisted of fossils from my father's collection, enable reasonable suggestions to be made:—*Ammonites herveyi* is an example of *Kamptokephalites*, *A. humphriesianus* is a species of *Homœoplanulites*—compare Pls. DXV, DXVI: both these Cornbrash specimens are now in the collection of University College, Nottingham, ex R.A.C. Coll.: their Cornbrash origin is not to be doubted, and there is good reason to suppose that they are the specimens cited by my father. The example of *B. hochstetteri* was found in my collection, among my father's specimens, and it may be concluded that it is what he quoted as *Am. subradiatus* from the Cornbrash, noting its distinction from what he called *A. discus*. It may, then, be suggested that the two species not yet re-discovered, "*A. brocchii*" and "*A. jurensis?*" are respectively a Macrocephalitid and an example of Blake's *Perisphinctes flagellans* (1905, 51, v, 3).

Evidence for the position of *B. hochstetteri* in the Cornbrash demands some consideration. The *Am. subradiatus* is quoted from Fairford (p 104): according to the Brachiopod for which it was noted, *Microthyris lagenalis*, this is Upper Cornbrash The matrix of the specimen is marly, with a slight bluish tinge, which suggests proximity to blue clay, either of Forest Marble below, or of Kellaways Clay above. If Fairford is the correct locality, the low position has little to support it: moreover, the Lower Cornbrash has been explored much more than the Upper, partly because the Upper Cornbrash has often been removed by pœne-contemporaneous erosion. Among a large number of Clydoniceratids collected by Dr. A. J. Douglas from the Lower Cornbrash of the Oxford district, I do not remember to have observed any examples of *Am. hochstetteri*.

On the other hand, Oppel quotes his type from Wiltshire (Juraf. 1857, 474), from neighbourhood of Chippenham (Ceph.; Pal. Mit., III, 1862, 147), which would be Lower Cornbrash; while Blake's localities (Mon. Cornbr., 1905, 56) do not help much: mostly, they may be Upper as well as Lower, but "S[outh] Cern[e]y" should be Upper.

Other evidence: In his paper on the Oolites (Q.J.G.S. XIV, 1858, 120), my father gives a section of Cornbrash on the Cricklade Road, Cirencester—Lower Cornbrash, resting on Forest Marble. In it there is no mention of a marly matrix. But, in p. 121, he gives a section of Shorncot, near Cirencester—Upper Cornbrash—the beds topped with Oxford Clay debris. Here the top bed of Cornbrash is "more or less mixed with marly bands."

The bulk of the evidence thus favours the placing of *Benedictites hochstetteri* in the Upper Cornbrash.

CLYDONICERATIDÆ, T.A., Pl. D. Family name for *Clydoniceras, Harpoceratidarum* and *Benedictites.* The name is required for genera which, in their outward shape, are like Oppelaceæ, but details of the suture-line—the broad, short lobes and shallow saddles, especially the shallow S1—mark them as doubtfully belonging to that super-family. In a very large number of Oppelaceæ S1 is deep, produced to be well in front of other saddles, so that a line joining the outward parts of the saddles is convex towards the aperture, the top of its arch being over S1.

The suture-line of *Clydoniceras* is more degenerate than that of *Harpoceratidarum*; but whether the comparative simplicity of the latter is due to persistent primitive simplicity, or has been produced by degeneration, cannot be stated. Any argument for relationship with families long deceased, based on its obvious similarity to the suture-lines of Hildoceratids or some Sonninines, is of little value: it would have just as much, or perhaps more, claim on these grounds to be joined to *Frechiella.* Any argument from the oxycone shape for alliance with Oppelaceæ is also valueless: it would simply recall the practice of old days, when any oxycone from Lias to Cretaceous, if not an *Oppelia,* was called *Oxynoticeras:* when it was thought that an oxycone of one Age could be the immediate progenitor of a quite different oxycone of another Age—an opinion still maintained in some quarters.

The suture-line of *Benedictites* might be a simplification of a suture-line similar to that of *Harpoceratidarum.* For simplification of suture-line see Pl. DXVII B.

SCARBURGICERAS, T.A., Pl. DVIII. The specimen figured, presumed to be the type of *Am. scarburgensis* described by Young and Bird, was received from Whitby Museum as one of the types of Simpson's *Ammonites, volutus*—quite a different shell. It has, possibly, become misplaced and mislabelled in course of time.

The genus differs from *Bourkelamberticeras* by longer EL and L1, and by L2 further from guide-line; by stronger herring-bone pattern of sub-distinctly carinate periphery, by great regularity of bifurcate ribbing, and by lack of intermittent failure of primaries.

This species is not the *Cardioceras scarburgense* quoted in earlier parts of this work and elsewhere: that is nearer to, in some cases identical with, Douvillé's *Quenstedticeras præcordatum.*

Bourkelamberticeras, Scarburgiceras and *Cardioceras præcordatum* appear to mark three distinct dates, and the differences between them require to be noted. They do not agree in their local occurrence.

HIPPOSTRATITES, S. Buckman, 1924, Legend of Pl. CDXCV. Genoholotype *H. hippocephalites.* Distinct from *Briareites* by suture-line—L1 of different pattern and L2 less developed. Distinct also in style of ribbing. Remarkable for cadonic inner whorls, with strong, almost tuberculate, costæ.

In *H. hippocephalites* the number of costæ on the whorl ending at 325 mm. diam. is 31; number on whorl ending at 485 mm., 43. This excludes the obliquely broken piece of whorl.

Another species, *H. rhedarius,* Pl. DXIV, distinct from *H. hippocephaliticus* by maintaining greater thickness, by not developing slight excentrumbilication, by difference in number of ribs—the whorl ending 360 mm. diam. has 39 ribs, and that ending 571 has 58. Consequently, at 410 mm. *H. rhedarius* has the number of ribs which *H. hippocephaliticus* does not attain till 480 mm. Consequently, the graphs of the ribbing of the two species run parallel, that of *H. rhedarius* maintaining a course about 6 per cent. above that of *H. hippocephaliticus.*

ARISPHINCTES. See Pls. DXI, DXII. The difference of this genus from *Perisphinctes* may be readily stated in the ingenious suture-line formula given by Neumann (Oxf. Cetech.; Beitr. Pal. Ost.-Ung., XX(1), 1907, 24). This genus has the formula EL = L1 > N, while *Perisphinctes* has the formula EL = N < L1—that is to say, *Arisphinctes* has EL and L1 of the same length, and the suspensive lobe—the Nahtlobus (N)—is longer; but *Perisphinctes* has EL and N both of the same length, and they are longer than L1, which is somewhat short. The length of all the lobes in *Arisphinctes* is very noticeable.

REINECKEIA, Bayle, Explic. Carte Géol. France, 1878, LVI, 1—3, *R. anceps*, genosyntypes—3 different species. Genolectotype, *R. anceps*; Bayle (non Reinecke), fig. 1.

REINECKEITES, g.n. Legend of Pl. DXXII. Genoholotype, *R. duplex*, nov. Differs from *Reineckeia* in early loss of tubercles and in almost regular dichotomy of ribs.

PARAPATOCERAS, Spath, (Blake Amm.; Pal. Ind., IX (1), 1924, 12)—"type: *A. calloviensis*, Morris, Ann. Mag. Nat. Hist. (1), Vol. V, 1846, p. 32, pl. VI, fig. 3." But this is not accurate enough: Morris's fig. 3 embraces 3 a—d, four figures, relating to at least two different specimens from two different localities, two different matrices and two different collections. It is necessary, therefore, to choose one of these, and so fig. 1a may be taken as genolectotype. This is from typical Kellaways Rock, Kellaways, Wilts.

SPIROCERAS, Quenstedt. Dr. Spath (loc. cit.) compares this with *Parapatoceras*, giving as its "genotype: *S. bifurcatum*, Quenstedt." But this is not exact enough, for Quenstedt in Der Jura, 1857 (not 1858), figures as *Hamites bifurcati* (Pl. LV, figs. 1—12) twelve different specimens belonging possibly to various species and to more than one genus: all these are genosyntypes of his *Spiroceras*, p. 407. One of these must be taken as genolectotype, and choice now falls on his fig. 2 as a fine specimen, with the characteristic short suture-line. For figures of *Spiroceras* see T.A. V, Pl. CDXCII.

AGASSICERAS. See T.A. I, 1909, *ii*. Dr. Spath (Amm. Blue Lias; Proc. Geol. Assoc. XXXV (3), 1924, 207) criticizes the genotype proposed in this work, cited above, which was an attempt on my part to preserve Hyatt's name, *Aetomoceras*, and to avoid the introduction of a new generic term. Dr. Spath's criticism is justified in view of the genotype-selection made in my paper in 1894 (Geol. Mag. (4) I, 357). Therefore the genotype of *Agassiceras* is, on strict nomenclatorial rules, as Dr. Spath rightly says, *Ammonites scipionianus*, d'Orbigny. This involves the following change: for *Aetomoceras* read *Agassiceras*.

EUAGASSICERAS, Spath, 1924 (op. cit. 208). A good substitute for *Agassiceras*, for which, as employed in this work, it is now to be read. The genoholotype is *Am. sauzeanus*, d'Orbigny (Spath, loc. cit.), not *Am. striaries*, as was the case with my 1909 selection.

AMMONITES. See T.A. IV, 1923, 56. It is to be hoped that Dr. Spath will be as strict in applying nomenclatorial rules to his own case as he is in regard to *Agassiceras*. Then he cannot argue, as he is now doing (op. cit., 202), that *Ammonites*, Meek, 1876, can take precedence of *Ammonites*, Bruguière, 1789, or that Meek's emendation of *Ammonites* can be any more valid than my emendation of *Agassiceras* in 1909 can override my *Agassiceras* of 1894.

His further argument about the identity of Bruguière's *Am. bisulcatus*, (Lang's Hartz specimen), from the composition of present-day Harzburg fauna, is of little value: what was found 200 years ago may not be discovered at the present day: where strata are preserved in pockets, as Jurassic beds so often are, such pockets once worked out may not re-appear. So far as is known, for instance, Sowerby's species of *Ammonites braikenridgii, Am. subradiatus* and *Am. sowerbyi*, found at or near Dundry about 100 years ago, have never been matched from Dundry, with all the work done there. *Rhynchonella wrighti*, from Leckhampton, *R. hopkinsi*, the large *Purpuroidea* and *Pachyrisma* from Minchinhampton Great Oolite, are also instances of fauna found 50 or 60 years ago not being met with since in the same localities.

There seems to be no warrant for Dr. Spath's statement that Lang's 1708 drawing is bad: it seems clear and characteristic. See T.A. CXXXI A.

CORONICERAS. See T.A. I, 1911, *vi*. Dr. Spath (op. cit., p. 202) says that I selected *Am. rotiformis* as genotype in my 1898 paper. (Q.J.G.S., LIV, 459.) This is a mistake on his part: I particularly desired to avoid making any definite selection of genotypes. My phrase merely states possibilities: it is not positive: it says: "In most cases the name which stands first may be considered as the type species." Had it said: In all cases the name which stands first is to be considered as the type-species—it would have been a different matter. But, even then, any selection in the case of *Coroniceras* would not have been valid: no one has the right to make it. Hyatt definitely, by his name, marked off one species in particular: that species becomes the holotype automatically—*Coroniceras coronaries.*

PSILOCERAS. The genotype is nearly always incorrectly given as *P. planorbis*. Here also the genotype is definitely fixed by the name, *Psiloceras psilonotum*. Even if *P. planorbis* were thought to be conspecific with *P. psilonotum*, it is not correct to quote the former as genotype. But they differ in proportions, they differ in distribution, and, according to the theory of dissimilar faunas, they differ in date.

CHRONOLOGY

It is desirable to break off for awhile the discussion of the very necessary systematic details, in order to continue the scarcely less necessary chronological studies. The divisions of the Perisphinctean and Cardioceratan Ages (Vol. IV, Tab. I) have now to be filled in, carrying to earlier times the chronology given in Tab. III, Vol. IV, embracing the time of the deposits commonly known as Corallian. Commencement is made with the big and complex development of the Corallian strata of Yorkshire.

Information concerning these strata is obtained chiefly from Blake and Hudleston's paper (The Corallian Rocks of England; Quart. Journ. Geol. Soc., XXXIII, 1877, v. The Yorkshire Basin, p. 315). It has been supplemented by some notes furnished by Mr. J. T. Sewell, by a considerable field-study of the Corallian rocks of the Oxford district, by some observation of those on the Dorset Coast and by studies of Ammonites from various collections.

Blake and Hudleston's paper is a monument of hard work, of painstaking industry in the study of sections, and is full of detail; but is marred by many faults of presentation. As these are to be found too frequently in present-day geological literature, it seems desirable to note them.

The paper is too discursive; the information is not systematized; there is no summary, no tabular statements of results; the sections are not numbered, the beds are often undistinguished by numbers or letters, there is no system of marking to carry one section on to another; the faunas are not given with the individual beds of the sections, but have to be dug out of several pages of attached text, and then are too often not clearly appropriated to their respective beds; while the descriptions of sections are given haphazard—sometimes in ascending, sometimes in descending order. Add to these points that the palæontology, so far as Ammonites is concerned, is most uncritical—a species of Ammonite like *A. plicatilis* being quoted from the top, middle and bottom of the strata—and it will readily be understood why the paper is remarkably difficult to follow. Instead of it being possible to grasp the sequence of strata in an hour or so of reading, as should have been feasible, if the details had been systematically presented, it has required, off and on, some ten years of study to obtain them. After trials at correlation on various plans, success, such as it is, only came by the adoption of the following laborious method:—

Each section, or at any rate each important section of the Yorkshire strata, was summarized—on account of space these summaries cannot be given. These summaries, collected into each of the four divisions into which the authors divided Yorkshire, were then placed in hypothetical sequence for each district, governed by the succession of strata in the individual sections. Then the stratal sequence of each district was compared, and, when brought into seemingly satisfactory line, the beds of each district Sequence were numbered. These results are presented in Sequences I—IV. Next, each bed of each district, properly numbered, was written on a separate slip of paper, the four piles—each slip bearing what may be called its faunal schlagwort—were placed side by side, and then sorted into one pile, after the manner of making an index: with this difference, that instead of the order being alphabetical, it was numerical—I, 2 had to precede I, 3; II, 5 had to succeed II, 4; while the schlagworts had to come together. It sounds fairly straightforward and satisfactory; it is otherwise in practice. But an author ought not to give a reader all this work before the latter can find out his meaning: he ought to do it himself when writing his paper, for he has advantages denied to the reader. He should not scatter and bury his facts in a litter of verbiage, so that the reader has to scratch them out: he should display them side by side as openly as possible, so that the reader may pick them up without effort. If he have twenty facts to set out, he should not take up forty pages to do it when, by systematic tabulation and analysis, he could be more intelligible in twenty-five. It may take longer to write the twenty-five pages than the forty; but he should receive no encouragement in mere production of words: there should be no boast of the number of pages of text produced.

In the present analyses of the Yorkshire portion of Blake and Hudleston's paper the results seem to work out fairly satisfactorily: they are given in Table II. But allowances will have to be made.

In some cases, as in that of the section of Abbotsbury, Dorset (p. 273), the authors have inadvertently given their section upside down: there is a suspicion in my mind that something of this kind may have happened to some of their Yorkshire sections—at any rate, some evidence has been rejected with that idea. Then it is possible that unobserved step-faulting may be the explanation of some faunal repetitions ; while all the time the present interpretations of their species-names of Ammonites are, of necessity, largely guess-work : research should gradually be able to place these ammonite-identifications on a surer basis, but that will take a long time.

Another factor to be taken into consideration is the phenomenon of re-deposition of faunas—a phenomenon long enough known in a general way, but one for which possibly nothing like enough allowance has been made.

In certain cases in the Sequences I—IV it may be noticed that the same bed is duplicated, or, rather, it has been subdivided—that is to say, it has been assumed that what Blake and Hudleston have taken as one bed is really a composite, made up not necessarily of deposits of sequent dates, but of deposits belonging to dates separated sometimes by a considerable interval. There is every justification for such a view, not only from the facts observed in the Jurassic rocks elsewhere, but especially in the facts of the Corallian deposits of the Oxford neighbourhood: there, in the Magdalen College pit of Headington Quarry—Headington Quarry is the name of the village largely built in the immense excavation of an old quarry—there is a thickness of some six feet of strata at one end of the pit, which peters out at the other—the sub- and superjacent deposits coalescing into one bed. And there are greater gaps than this, which will be referred to later.

A system of reference-lettering has been adopted for the Sequences and the Table, which enables the reader to compare them all at a glance, and also shows at once the gaps in the Sequences of the different districts according to the present interpretation.

No account has been taken of the thicknesses of individual beds, because chronological sequences are not concerned with them. Little attention has been paid to lithic characters, because there is reason to suppose that they are not constant from place to place, or, where they seem to be constant, that the lithic planes do not necessarily coincide with the faunal planes—all these phenomena being quite well known in other Jurassic rocks.

It may, however, be interesting to glance at the total thickness of the Corallian rocks of Yorkshire, which have now been divided among some fifty or more intervals of time.

The stratigraphical table at the end of Blake and Hudleston's paper shows a thickness of over 300 feet in one section. But if, as is the right way to work, allowance be made for deficiencies in this section which are filled in others, and if the maxima of deposits of each time-interval be added together, the total thickness of deposit would be nearer 600 feet. A rough addition of the maxima of Blake and Hudleston's stratigraphical divisions gives much the same result. So this thickness is some measure, in the shape of work done, of the length of time covered by the "Corallian" (Cardioceratan and Perisphinctean Ages) ; but there is every reason to suppose it is a very incomplete measure, bearing perhaps as much relation to the total thickness of deposition made in the world during those Ages as the scattered flints of the hillside bear to the original chalk deposit of which they are the remnants.

In the following Sequences the numbers in brackets after the place-names refer to the pages of Blake and Hudleston's paper. The fauna placed in the right hand column is obtained from the same or an adjacent page in most instances, though, occasionally, an item has been gleaned from a separate part of the paper.

SEQUENCE I—SCARBOROUGH DISTRICT (317)

Refs.	*Strata*	*Fauna*
D. 1.	Hackness (329)	
	1. Upper Calc-Grit	Ammonites biplex [Dichotomoceras]
Q. 2.	Seamer (326)	
	[a]. Coral Rag	Thamnastræa concinna
	Hackness (329)	
	2. Upper Coral Bed	Tham. concinna
	Forge Valley (321)	
	a. Coral Rag	Thamnastræa
S. 3.	Seamer (326)	
	[b]. Coralline Oolite	Rhabdophyllia
	Forge Valley (321)	
	b. Coralline Oolite	Rhabdophyllia
W. 1.	Forge Valley 321	
	c. Intermediate Series	Chemnitzia (large)
	Derwent Gorge (325)	
	1. Oolites	Chem. hedding.
X. 5.	Derwent Gorge	
	2. Buff Grits	Phasianella
	Hackness (329)	
	3 a. Bell-heads Limest.	Phasianella
Y. 6.	Hackness	
	3 b. Bell-heads Limest., Oolites	Phasianella; Chemnitzia
Z. 7.	Scarborough (324)	
	A. Coralline Oolite	Nerinæa
	Seamer (326)	
	[c]. Oolite	Nerinæa visurgis
AA. 8.	Seamer (326)	
	[e]. Shelly Bed, Snake Bed	Am. plicatilis
CC. 9.	Hackness (329)	
	3 c. Thecosmilia Rag	Thecosmilia
	Seamer (326)	
	[g]. Coral Shell Bed	Thecosmilia (Fauna megalomorphic)
DD. 10,	Seamer (326)	
	[h]. Pisolite	Exogyræ
	[j]. Pisolite	Exogyræ; Echin. scutatus
	Suffield [I], (331)	
	a. Shelly limestones	Exogyra nana;
G.G. 11.		Echinob. scutatus
	b. Oolites	
II. 12.	Suffield	
	c. Suboolitic limestones	Am. cordatus
	Filey (318)	
	A 2. Gritty limestone	Am. cordatus;
NN. 13.		Am. goliathus [Goliath. capax ?]; Am. plicatilis var.; Am. perarmatus,

SEQUENCE I—SCARBOROUGH DISTRICT (continued)

Refs.	*Strata*	*Fauna*
NN, 13.	Derwent Gorge (324, 5)	
	[4]. Oolitic roadstone	Am. goliathus, (obese)
OO. 14.	Filey (318)	
	B. Filey Brigg Grit	
SS. 15.	Filey (318)	
	C 1. Calc-grit	Rh. thurmanni (rare)
	Forge Valley (321)	
	C c¹. Passage Beds	Rh. thurmanni
TT. 16.	Scarborough Castle (324)	
	B a. Gritty Limestone	Rh. thurmanni; Waldh. hudlestonei
	Suffield [II] (331)	
	[II] b. Lower Coral Rag	Wald. hudlestonei
UU. 17.	Filey (318)	
	C 2. Brachiopod Beds	Wald. hudlestonei; W. bucculenta; Ter. fileyensis; Rh. thurm. (v.c.)
V.V. 11.		Amm. cordatus; goliathus; [Sagitticeras ?]; perarmatus var.
WW. 19.	Derwent Gorge (324, 5)	
	[6]. Calcareous Flags	Am. cordatus
YY. 20.	Scarborough Castle (324)	
	B b. The Red Beds	
	Irton Moor (323)	
	[1]. Ferruginous Limestone	Am. williamsoni
ZZ. 21.	Filey (319)	
	D 1. Ball Beds	Rh. thurmanni
	Scarborough Castle (324)	
	C c. Ball Beds	
AAA. 22.	Filey (319)	
	D 2. Blue rock, fossils chalcedonized	
DDD. 23.	Scarborough Castle (324)	[Korythoceras]
	C d. Cherty Bed	
EEE. 24.	Olivers Mount (321)	
	[1]. Lower Calc-Grit, lower beds	Avic. braamburiensis; Rh. lacunosa
FFF. 25.	Filey (319)	
	D 3. Siliceous Limestones	Am. cordatus [Miticard. mite ?]; Rh. thurmanni; Gryphæa dilatata
III. 26	Filey (319)	
	D 3. Siliceous Limestones	Am. perarmatus (thick form, with very prominent spikes)—[Aspidoceras hirsutum ?]

SEQUENCE II—PICKERING DISTRICT (333)

Refs.	*Strata*	*Fauna*
C. 1.	Pickering (335)	
	a. Upper Calc-Grit	Am. alternans [Prionodoceras]
D. 2.		Am. biplex [Dichotomoceras]
E. 3.		Am. cf. achilles
C. 1.	Sinnington (347)	
	B 1. Red Beds	
E. 3.	B 2. Hard blue	Am. achilles
F. 4.		Am. berryeri; Am. decipiens [Ringsteadia]
G. 5.	B. 3. Shaly Sands	
	Pickering (333)	
	b. Shales and Sands	Ostrea bullata
J. 6.	c. Throstler	
K. 7.	Sinnington (347)	
	C 1. Coral Rag	Cidaris florigemma
S. 8.	C 2. Rhabdophyllia Bed	Rhabdophyllia
	Pickering (335)	
	d. Rhabdophyllia Rag	Rhabdophyllia
T. 9.	Sinnington (347)	
	D a. Coralline Ool., Limest.	Phasianella
U. 10.	Pickering (335)	
	e. Black Posts	
V. 11.	e [1]. White ool.	Am. varicostatus [Toxosph. ingens ?]
W. 12.	f. Chemnitzia limest.	Chemnitzia
	Sinnington (347)	
	D b. Chemnitzia limest.	Chem. heddingt.
AA. 13.	Pickering (335)	
	g. Limestones & Pisolites	Thamnastr. arachnoides Nerinæa visurgis
FF. 14.	Pickering (337)	
	g β. Oolite	N. visurgis (large)
	Sinnington (347)	
	D b. Chemnitzia limestone	Nerinæa; Ech. scutatus
G.G. 15.	Pickering	
	h [a]. Trigonia Beds	Chemn. heddingt.
HH. 16.	[b] Ditto	Am. plicatilis [Am. maximus]
JJ. 17.	Pickering	
	h [c]. Trigonia Beds	Am. vertebralis [Vertebriceras]; Am. cordatus (excavatus)
KK. 18.	Sinnington (347)	
	D c. Bluish limest.	
	Highfields (Thornton, 342)	
	[c]. Blue rock, oolitic	Am. plicatilis [Cymatosphinctes ?]
LL. 19.	[e]. Hard blue rock	[Am. chalcedonicus]
MM. 20.	[f]. Flaggy sandstone	Avicula expansa

SEQUENCE II—PICKERING DISTRICT (continued)

Refs.	*Strata*	*Fauna*
	Whitethorn (343)	
	a. Purplish limest.	Am. plicatilis (less common)
NN. 21.		A. perarmatus, type form A. goliathus (freq.)
QQ. 22.		A. cordatus (excavatus), [Anac. excavatum ?]
RR. 23.	Pickering (335)	
	i. Calc-Grits	Am. cordatus [Anacard. cordatum]
CCC. 24.	Whitethorn (343)	
	b. White Oolite	Cylindrites

SEQUENCE III—HAMBLETON DISTRICT (349)

Refs.	*Strata*	*Fauna*
C. 1.	Nunnington [I] (359)	
	[b]. Upper Calc-Grit	Am. serratus [Prionodoceras]
D. 2.		Am. biplex [Dichotomoceras]
F. 3.		Am. sp. cf. thurmanni [Ringsteadia]
I. 4.	Helmsley (354)	
	[a]. Limestone with many flints	Terebratula insignis
	Ampleforth-Oswaldskirk (356-8)	
	4[1]. Intracoralline Beds	Terebratula insignis
K. 5.	Amplef.-Oswaldsk.	
	4[1]. Coral Rag	Cidaris florigemma
	Sproxton (354)	
	a. Coral Rag	Cid. florigemma
Q. 6.	Nunnington [I] (359)	
	[c]. Coral Rag	Thamnastræa
R. 7.		Thecosmilia
	Helmsley (354)	
	[b]. Coral Shell Bed	Thamnastræa Thecosmilia
S. 8.		Rhabdophyllia
W. 9.	Amplef.-Oswaldskirk (356-8)	
Z. 10.	Coralline Oolite : Chemnitzia limest.	Chem. heddingtonensis Nerinæa
	Oswaldskirk Hagg (357)	
	4 β. Shell Bed	Chem. heddingt.
	Nunnington	
	[d]. Shell Bed	Nerinæa ; Chemnitzia
BB. 11.	Hambleton area (352)	
	3. Wass Moor Grit	
EE. 12.	Nunnington [II] (359)	
	[d 3]. Shivery oolites	Am. plicatilis, occasional [Per. antecedens ?]

SEQUENCE III—HAMBLETON DISTRICT (continued)

Refs.	*Strata*	*Fauna*
	Helmsley (353) [d]. Hambleton Ool.	Am. plicatilis [Per. antecedens ?];
GG. 13.		Echinobrissus scutatus
	Hambleton area (351, 2) 2. Hambleton Oolite	Echinob. scutatus;
H. 14.		Am. cord.; Rh. thurm.
NN. 15.	Hambleton area (351) 1 [b]. Semi-oolitic beds	Am. goliathus
SS. 16.	Hambleton area (351) 1 [a]. Sandstone with cherty bands	Rhynchonella thurmanni
JJJ. 17.	Hambleton area (349) [o]. " Ferruginous sandstone earlier than [Corallian] "	[Aspidoceras silphouense ?]

SEQUENCE IV—HOWARDIAN HILLS (361)

Refs.	*Strata*	*Fauna*
A. 1.	Hildenay (372) [a]. Kimm. Clay	Ammonites mutabilis [Rasenia]
B. 2.	Burdale (380) [a]. Kimm. Clay	Deltoid Oysters
C. 3.	North Grimston (374) (Burdale, 380) 1. Supra-coralline: Cement Stone	Am. sp. (cf. alterna and serratus) [Prionodoceras]
	North Grimston (374) 2 [a]. Coral Rag—N.G. Limestone	Am. alternans [Prionodocera
D. 4.		Am. varicostatus-plicatilis [Dichotom.]
H. 5.	Wharrum Road (378) [a 1]. Buff Limestones (top)	Nautilus aganiticus
I. 6.	Hovingham (369) [a 1]. In or above Rag	Terebratula insignis
K. 7.	Wharrum Road (378) a. Coral Rag	Cidaris smithi
	Malton (364) [1]. Coral Rag	Cidaris florigemma
L. 8.	Sike Gate (370) 1—6. Urchin Bed	Collyrites bicordatus
	Hildenay (372) [c]. Building Stone	Collyrites bicordatus; Am. varicostatus
	Malton (364) [2]. Oolites	Am. varicostatus
	Wharrum Road (378) b. Soft brash	Am. varicostatus

SEQUENCE IV—HOWARDIAN HILLS (continued)

Refs.	*Strata*	*Fauna*
M. 9.	North Grimston (374) 2 [a]. Coral Rag	Am. varicostatus var. plicatilis
N. 10.	Sike Gate (370) 6. Brash	Am. plicatilis
O. 11.	Sike Gate (370) 8. Amm. Bed	Am. plicatilis; Am. perarmatus var. [Am. eucyphus?]; Am. cawtonensis [Cawt. cawtonense]
	North Grimston (374) 2 [b]. Coral Rag	Sike Gate Am. [Am. cawtonensis]
P. 12.	North Grimston 3. Mamillated Urchin series	Cordate Amm. [Am. maltonensis ?]
R. 13.	Wharrum Road (378) c. Limestone and Flint	Thecosmilia; Rhabdophyllia
S. 14.	(Fauna megalomorphic) North Grimston (374) 3 c. Buff Limestone	Thecosmilia; Rhabdophyllia
	Hovingham (369) [b]. Coral Limestones	Thecosmilia; Rhabdophyllia
T. 15.	Malton (366) b. Coralline Ool., White oolite	Phasian. striata
W. 16.	Malton (366) c. [1]. Shelly ool.	Chem. heddingtonensis
	Appleton (363) A [1]. Hard ool. limest.	Chemnitzia; Ech. scut.
GG. 17.	North Grimston (374) 4. Drab coloured oolites	Echinob. scutatus
HH. 18.	Swinton Grange (364) A. White Oolites	Echinob scutatus; Am. plicatilis [P. martelli/biplex ?]
	Malton (366) c. [2]. Fine-grained oolites	Am. plicatilis [P. martelli/biplex]
II. 19.	Appleton (363) A [2]. Hard ool. limest.	Am. cordatus
	Malton (364) A a. Subool. limestone b. Fine-grained calc-grit	
XX. 20.	c. Buff limestone	Large Ammonites [Goliath. capax ?]; No Brachiopods

SEQUENCE IV—HOWARDIAN HILLS (continued)

Refs.	*Strata*	*Fauna*
PP. 21.	Malton C. d. Calc-grit and blue stone	Am. plicatilis [Kranaosphinctes ?] in upper part No Brach.
SS. 22.	Appleton (363) B. Passage Beds	Rhynchonella thurmanni
N.N. 23.		Waldheimia bucculenta; Terebr. fileyensis
	Appleton (363) C. [1]. Lower Calc-Grit, highest beds	Rhynchonella thurm. (common)
WW. 24.	C. [2]. Ditto	Am. cordatus; Am. plicatilis [Kranaosphinctes ?]
XX. 25.		Am. perarmatus [Aspidoceras acuticostatum]; Am. goliathus [Sagitticeras ?]
	Castle Howard (361) [1]. Lower Calc-Grit (Basal portion)	Rhynchonella thurmanni, v.c.; Am. cordatus; Am. vertebralis; [Sagitticeras ?] Am. perarmatus
BBB. 26.	[2]. Ditto	Large Aptychi; Immense Belemnites
FFF. 27.	[3]. Ditto	Gryphaea dilatata

SEQUENCE V—SALTERSGATE MOOR, WHITBY

(Information and specimens from Mr. J. T. Sewell, J.P.)

Refs.	*Strata*	*Fauna*
GGG.	1. Chalcedonic rock with small Ammonoids	Cardioceras aff. præcordatum
HHH.		C. aff. cardia; cf. Hortoniceras sidericum
JJJ.	2. Oxford Clay—a yellowish sandstone [= ? B. & H., Seq. III, 17 = matrix of *Aspidoceras silphouense*, T.A. CCCLXIV]	Peltoceras cf. constantii; Eboraciceras cf. subordinarium

SEQUENCE VI—CORALLIAN AMMONOIDS

This is a list of the Ammonoids from Corallian and associated strata, which have been figured in Type Ammonites. This list, as it includes several Yorkshire types, may explain the interpretations which have been given to the names used by Blake and Hudleston: those are set forth in the last column, and may be regarded as presumably the names which they would have used: the other columns refer to the figured specimens. Interpretations of some of their other names, examples of which have not yet been figured, are placed in square brackets in the Sequences, I—IV, pp. 37-43.

No.	*Names*	*Plates*	*Localities*	*B. & H. names*
1.	*Triozites*	494	Dorset	*Am. mutabilis*
2.	*Prionodoceras*	155, 421, 462, 464	Bucks, etc.	*Am. serratus* *Am. alternans*
3.	*Dichotomoceras*	139	Oxon	*Am. biplex*
4.	*Ringsteadia*	225	Wilts	*Am. berryeri* *Am. decipiens* *Am. pseudocordatus*
5.	*Cawtoniceras*	454	Cawton, Yorks	*Am. cawtonensis*
6.	*"Toxosphinctes" ingens*	184	Pickering	*Am. varicostatus*
7.	*Toxosphinctes pickeringius*	448	Pickering]	*Am. plicatilis*
8.	*Perisphinctes*	282	Oxon	*Am. plicatilis*
9.	*Arisphinctes*	511, 512	Yorks Oxon	*Am. varicostatus* *Am. plicatilis*
10.	*Vertebriceras*	198	Oxon	*Am. vertebralis*
11.	*Cymatosphinctes*	450	Oxon	*Am. plicatilis*
12.	*Chalcedoniceras*	295	Thornton	
13.	*Goliathiceras*	132, 349	Malton	*Am. goliathus*
14.	*Kranaosphinctes*	243, 449	Oxon	*Am. plicatilis*
15.	*Anacardioceras*	420, 463	Oxon	*Am. excavatus* *Am. cordatus*
16.	*Sagitticeras fastigatum*	280	Hunts	*Am. vertebralis*
17.	*Sagitticeras sagitta*	260	Dorset	*Am. goliathus*
18.	*Aspidoceras acuticostatum*	438	[Malton]	*Am. peramatus*
19.	*Koryt oceras*	361	Isle of Skye	*Am. cordatus* [" *Am. scarburgensis*, L.C.G., Scarborough," Whitby Mus.
20.	*Miticardioceras*	375	Bucks	*Am. cordatus*
21.	*Hortonicera;*	296	Oxon	*Am. goliathus*
22.	*Aspidoceras silphouense*	364	Sutherl.; Yorks	*Am. perarmatus*

TABLE II — YORKSHIRE "CORALLIAN"
(Summary of Sequences I—VI)

Names of Ammonoids are in capitals, and when between brackets are often interpretations of Blake & Hudleston's terms. Other items are quoted as they gave them.

References	*Hemera or Horizon*
A. IV, 1; VI, 1,	[RASENIA or TRIOZITES]
B. IV, 2	Deltoid Oysters
C. II, 1; III, 1; IV, 3; VI, 2	[PRIONODOCERAS]
D. I, 1; II, 2; III, 2; IV, 4 VI, 3	[DICHOTOMOCERAS]
E. II, 3	"ACHILLES"
F. II, 4; III, 3; VI, 4	[RINGSTEADIA]
G. II, 5	Ostrea bullata
H. IV, 5	Nautilus aganiticus
I. III, 4; IV, 6	Terebratula insignis
J. II, 6	Throstler
K. II, 7; III, 5; IV, 7	Cidaris
L. IV, 8	AM. VARICOSTATUS; Collyrites bicordatus
M. IV, 9	AM. VARICOSTATUS-PLICATILIS
N. IV, 10	AM. PLICATILIS
O. IV, 11; VI, 5	[CAWTONENSE]
P. IV, 12	[AM. MALTONENSIS]
Q. I, 2; III, 6	Thamnastræa
R. III, 7; IV, 13	Thecosmilia
S. I, 3; II, 8; III, 8; IV, 14	Rhabdophyllia
T. II, 9; IV, 15	Phasianella
U. II, 10	Black Posts
V. II, 11; VI, 6	[" TOXOSPHINCTES " INGENS]
W. I, 4; II, 12; III, 9; IV, 16	Chemnitzia
X. I, 5	Phasianella
Y. I, 6	Chemnitzia
Z. I, 7; III, 10	Nerinæa
AA. I, 8; II, 13; VI, 7	[TOXOSPHINCTES PICKERINGIUS]
BB. III, 11	Wass Moor Grit
CC. I, 9	Thecosmilia
DD. I, 10	Exogyra
EE. III, 12	[" PERISPHINCTES ANTECEDENS "]
FF. II, 14	Nerinæa
GG. I, 11; II, 15; III, 13; IV, 17	Echinobrissus scutatus
HH. II, 16; IV, 18; VI, 8—10	[PERISPHINCTES BIPLEX (MARTELLI)]
II. I, 12; III, 14; IV, 19	[CARDIOCERATE]
JJ. II, 17; VI, 10	[VERTEBRICERAS]
KK. II, 18; VI, 11	[CYMATOSPHINCTES]
LL. II, 19; VI, 12	[CHALCEDONICUS]

TABLE II—YORKSHIRE "CORALLIAN" (continued)

References	*Hemera or Horizon*
MM. II, 20	Avicula expansa
NN. I, 13; II, 21; III, 15 IV, 20; VI, 13	[GOLIATHICERAS]
OO. I, 14	Filey Brigg Grit
PP. IV, 21; VI, 14	[KRANAOSPHINCTES]
QQ. II, 22; VI, 15	[ANACARDIOCERAS EXCAVATUM]
RR. II, 23; VI, 15	[ANAC. CORDATIFORME]
SS. I, 15; III, 16; IV, 22	Rhynch. thurmanni
TT. I, 16	Waldheimia hudlestoni
UU. I, 17; IV, 23	Waldheimia bucculenta
VV. I, 18; IV, 24; VI, 16, 17	[SAGITTICERAS SAGITTA]
WW. I, 19; II, 23	"AM. CORDATUS,"
XX. IV, 25; VI, 18	[ASPID. ACUTICOSTATUM]
YY. I, 20	AM. WILLIAMSONI
ZZ. I, 21	Ball Beds
AAA. I, 22	Blue Rock
BBB. IV, 26	Large Aptychi
CCC. II, 24	Cylindrites
DDD. I, 23; VI, 19	[KORYTHOCERAS]
EEE. I, 24	Avicula braamburiensis, Rhynch. lacunosa
FFF. I, 25; IV, 27; VI, 20	[CARDIOCERATE] [MITICARDIOCERAS ?] Gryphaea dilatata
GGG. V, 1	PRAECORDATUM
HHH. V, 1; VI, 21	CARDIA
III. I, 26	AM. PERARMATUS var. [Cf. ASPIDOCERAS HIRSUTUM]
JJJ. V, 2; III, 17; VI, 22	[ASPIDOCERAS SILPHOUENSE; EBORACICERAS ?]

Since the Sequences I—VI and Table II were compiled, I have seen some poor and worn (derived ?) Ammonites from Yorkshire, which suggest *Tornquistes*, Lemoine. This is a genus of the Terrain à Chailles, a deposit whose date must be fairly early in the Cardioceratan.

It is possible that some of the forms quoted as *Am. goliathus* by Blake & Hudleston, for instance, Appleton, p. 43, XX, 25, should be interpreted as *Tornquistes* rather than as *Goliathiceras* or, as suggested, *Sagitticeras*. *Tornquistes* would be expected somewhere between UU and EEE of Table II, either as a separate date-mark to those now given or sharing one of the dates.

The zoological position of *Tornquistes* is possibly with the Cadoceratidæ (Cardioceratidæ) as Dr. Spath long ago suggested to me—that is with *Goliathiceras*, *Chalcedoniceras* and '*Stephanoceras*' *polyphemus*, all genera marking Cardioceratan Age.

The statement made (T.A. II, 1918, *xiii*) regarding *Tornquistes* and Pachyceratidæ needs more revision than was accomplished by removal of Macrocephalitidæ (T.A. IV, 1922, CCLXXXIII; 1923, 54). The discovery of *Chalcedoniceras* (T.A. IV, 1922, CCXCV) seems to reveal the relationship of '*Stephanoceras*' *polyphemus* to *Goliathiceras*.

SEQUENCE VII—SCOTLAND, PORT AN RIGH, N.E.

" Section seen on shore from Port an Righ, [Balintore, Ross], to a position ½-mile north-east of it." Faunal details from specimens submitted by the Geol. Survey of Scotland. Stratal details summarized from the Collector's records.

Correlation		*Strata*	*Fauna*
EE of Yorkshire, Table II, p. 46	9.	Sandstone	*Perisphinctes* of *wartæ* style; *P.* cf. *stenocycloides*; *P.* cf. *biplex*
Brown Course Headington			
NN to XX of Yorkshire, Tab. II, p. 46	8.	Nodular ironstone ribs, 6 ft.	*Goliathiceras*; *Kranaosphinctes*; *Anacardioc. nikitinianum/ excavatum*; *Anac. excavatum*; " *Cardioceras* cf. *tenuicostatum*." " *C.* cf. *cordatum* "; *Perisphinctes plicatilis*; *Rhynch. thurmanni*; *Aspidoceras acuticostatum*
Lower Calc. Grit (top of Littlemore Sands), Oxon			
All but *C.* cf. *suessi*, not yet seen elsewhere: that suggests lower part of Nothe Grit, Weymouth	7.	Sandstone, 1 foot	*Anacardioceras* cf. *excavatum*, nodulate and costate; *Goliathiceras*, costate; *Cardioceras*, coarse-ribbed; *C.* cf. *suessi*
Horton Beds, Oxon GGG & HHH, Yorkshire, Tab. II	6.	Shale, 26 feet	*Rhynch. thurmanni. Cardioceras* cf. *tenuicostatum*; *C.* cf. *præcordatum*; *C.* cf. *cardia*
	5.	Doggers, 1 foot	
	4.	Shale, 1½ feet	
	3.	Sandstone, 2 feet	
Horton Beds, Oxon	2.	Sandy Limestone, 2 feet	*Cardioceras* cf. *præcordatum*; *C.* cf. *cardia*

SEQUENCE VIII—SCOTLAND, PORT AN RIGH, S.

" Section seen on shore to ½-mile south of Port an Righ (Judd's Cadh an Righ locality)." See Seq. VII.

Correlation		*Strata*	*Fauna*
Seq. VII, 8 FFF of Yorkshire, Tab. II? Oxford Clay, Yorkshire, in places (*vernoni*)	11.	Ironstone Balls in Sandstone, 3 feet	*Cardioceras cordatum*, etc. *Card.* cf. *nikitinianum*; *Card. excavatum*; *Klematosphinctes vernoni*
Seq. VII, 6–2	10.	Limestone and Shale, 56½ feet	*Cardioceras* cf. *præcordatum*; *C. cardia*
	9.	Gap, 12 feet	
	8.	Doggers, 1 foot	
	7.	Gap, 4 feet	
Tidemoor Point beds, Fleet, Weymouth	6.	Shale, with calcareous Sandstone, 14 feet	*Bourkelamberticeras* spp.

SEQUENCE IX—SCOTLAND, ARDASSIE POINT

(On shore, ½-mile due east of Brora Railway Station, Sutherland. A selection of some specimens submitted by Geol. Survey, Scotland. Stratal details summarized from their Collector's notes.)

Correlation	*Strata*	*Fauna*
14, 13, Cf. Couches A, B, Novosselki (Riasan), Russia—Ilovaïsky, 1903	14? Carbonaceous Sandstone, a few feet	*Cardioceras* sp. (binodulate), cf. *zenaidæ* Ilovaïsky
Cf. Worminghall Rock—*Gryphæa dilatata* Beds, Worminghall, Bucks 13. Cf. Loriol's *Rhabdocidaris*-beds	13. Grey Limestone, 2 feet	*Cardioceras* sp. (binodulate); *C. cordatum*, Loriol, 1902, II, 9; *C.* cf. *excavatum* (thin); *C.* like sp. from Worminghall Rock, Bucks (*Miticardioceras*); *Perisphinctes*, like sp. from Worminghall Rock (? *P. intercedens*, Ilovaïsky)
Cf. Red Beds, Weymouth	12. Carbonaceous Sandstone, 3½ feet	Perisphinctid; *Cardioceras* sp. (coarse-ribbed)
Cf. Loriol's *Pholadomya exaltata* beds	11. Hard Sandstone, 1 foot 2″	*Cardioceras* cf. *cordatum*, Loriol, 1902, II, 12
Cf. Red Beds, Weymouth Cf. *Cordatus* fauna of Ardennes	10. Soft sandstone, 6 feet	*Cardioceras* cf. *rouillieri*
Cf. Loriol's *Pholadomya exaltata* beds	9. Grey limestone, 1 foot	*Card.* cf. *zieteni*, *C.* cf. *excavatum* (thin), *C. excavatum* ? *C.* spp. var., cf. Loriol, 1902, II
	8. Sandstone, 1 foot 10″	
Cf. Oxford Clay of Yorkshire	7. Grey limestone, 1 foot 4″	? *Klematosphinctes vernoni*; *Card.* cf. *tenuicostatum*
	6. Sandy shales	*Card.* cf. *tenuicostatum*
Cf. Bowood Park beds, Wilts, clays below Lower Calc. grit	5. Grey limestone, 1 foot 2″	*Card.* cf. *tenuicostatum*; *C.* cf. *excavatum* (thin); *C.* cf. *dieneri*
4—1, Cf. lower part of Nothe Grit Weymouth	4. Shaly limestone, 3 inches	*Card.* cf. *tenuicostatum*; *C.* cf. *excavatum* (thin); *C. cordatum*, *C.* cf. *suessi*; *C.* sp. (binodulate)
	3. Grey limestone, 1 foot	*C. cordatum* ? *C.* cf. *excavatum* (thin); *C.* cf. *tenuicostatum*
	2. Platy limestone, 1 foot 3″	*C. suessi* ? *C.* cf. *cordatum*
	1. Limestone, 1 foot	*C.* sp. (not tuberculate ?)

TABLE III — SCOTTISH STRATA
(Summary of Seqq. VII—IX, see also Vol. IV, Seq. IX)

Hemeræ	*Strata*
wartae [*antecedens*]	Port an Righ Sandstones (upper)
biplex [*martelli*]	,, ,, ,, ,, ,,
Goliathiceras	Port an Righ Ironstones
Kranaosphinctes	,, ,, ,,
excavatum	,, ,, ,,
Rh. thurmanni	,, ,, ,,
acuticostatum	,, ,, ,,
suessi	Port an Righ Sandstone (lower)
zenaidæ	Ardassie Beds
mite	,, ,,
rouillieri	,, ,,
dieneri	,, ,,
braamburiensis (*Pteria*)	Brora Sandstone
Cardiocerate	Uppat Sandstone
praecordatum	Port an Righ Shales
cardia	Port an Righ Limestones

The names given in Sequences VII—IX are to be taken, mainly, as only approximate, for the following reasons :—The specimens, particularly those found *in situ*, are mostly rather poor : they were labelled a few years ago, when available names were not so numerous, and for lack of distinctive terms several different forms had to be given the same appellation.

Without another critical study of the specimens, it has not been considered advisable to alter the names from those originally given, except in these cases—*Cardioceras præcordatum* has been substituted for *Cardioceras scarburgense* (see Vol. IV, p. 32) and *Cardioceras excavatum* has been altered generically to *Anacardioceras* (see Pl. CDLXIII). But in the case of '*Cardioceras* cf. *excavatum* (thin)' the generic name has not been touched : these forms, for there are more than one species, are neither *Cardioceras* nor *Anacardioceras :* one form may be related to *Cardioceras suessi*, another to *Miticardioceras*, another to *Cardioceras vagum*, Ilovaïsky. Then the name *Cardioceras* cf. *cordatum* covers various species—some of them figured by de Loriol, who has forms from several different horizons all under the label *Cardioceras cordatum*. Then *C.* cf. *tenuicostatum* of the Scottish lists includes various forms : it means no more than Cardioceratid-like forms with approximate small ribbing after the pattern of that of *C. tenuicostatum*—such forms occur in the strata of several sequent hemeræ.

A study of the Seqq. VII—IX shows that there is not much difficulty in placing the strata of the first two, but that the last, Ardassie, reveals little correspondence with the fauna of the Yorkshire beds. Its species, with a few exceptions, appear to be new to English strata, but they have a likeness to Russian forms figured by Ilovaïsky. But his faunal sequences are very misleading : he figures certain species, and gives to them names of well-known forms, but these identifications are particularly wrong. So without considerable interpretation his records are of little help in stratal correlation.

The general position of the Ardassie limestones may be surmised—that they come between YY and GGG of Table II, p. 46. That is to say, they come at a time when there is a great paucity of Ammonites in the English rocks.

There it is necessary to leave the Ardassie strata while other sequences are worked out. The Oxford Oolites of the Oxford neighbourhood require notice, and are remarkable for the big gaps which their strata reveal, and the variability in preservation in contiguous localities.

SEQUENCE X — HEADINGTON QUARRY, OXFORD
(Magdalen Pit, near Workhouse)

Hemeræ	*Strata*	*Thickness*
	8. Whitish Oolite—" PENDLE & RUBBLE," with the " WHITE COURSE the bottom 4 inches "	4′ 0″
	7. Rubbly Beds, containing a " Hard Bed "—" UPPER HEADINGTON HARD "—which is not continuous; total about	2′ 6″
	6. Hard crystalline shell-bed, false-bedded in places. Used with and for " HEADINGTON HARD," but not so good	1′ 6″
	5. Rubbly Beds, coralline	1′ 6″
	4. Hard, somewhat shelly bed, with *Chemnitzia*-casts. " THE TRUE HEADINGTON HARD or HEDGEHOG STONE—the toughest in the pit; this fails sometimes at E. end of quarry "..	1′ 9″
antecedens	3. " THE BROWN COURSE." Rubbly beds not coralline. This contains Perisphincteds of the *wartæ-antecedens* style—forms with much compressed whorls like *Dichotomoceras*. This bed coalesces with Bottom Bed at E. end of quarry or runs out	4′ 0″
biplex	2. " BOTTOM BED, BOTTOM COURSE "—hard, shelly bed. According to workmen, contains the main of the Ammonites and fossils. Thickens to about 4 feet at W. end of pit. At east end the Headington Hard, when present, is only 2 feet from the Sands. *Perisphinctes biplex*, No. 3555, Pl. CCLXXXII ..	2′ 0″
excavatum ?	1. LITTLEMORE SANDS, without doggers or hard beds, exposed about 3 feet occasionally. *Goliathiceras microtrypa* (T.A. CCCLXXX) derived from denuded hard bed of these sands and re-deposited " in Bottom Course, about 5 inches up " (workmen) ..	3′ 0″

Details of beds vary a good deal. As the Headington Hard is about 8 feet above Sands at west end of pit, and only about 2 feet above at E. end, there is a non-sequence—stratal failure—of about 6 feet in the face of pit on the E. as compared with the W.

SEQUENCE XI — COWLEY, OXFORDSHIRE

(Quarry on S. side of road Horspath to Cowley, and N. of Industrial School. Pit close to road—North Pit.)

Hemeræ		*Strata*	*Thickness*
	[5] 1.	CORAL RAG. Oolite rubble, with massive Corals: *Isastraea*	4′ 0″
	[4] 2.	Hard grey stone, not conspicuously shelly. Occasional Corals	1′ 6″
antecedens	[3] 3.	Brown, earthy grit. *Pygaster umbrella*; *Echinobrissus scutatus*	4″
	[2] 4*a*.	Irregularly decomposed, yellowish	
biplex	4*b*.	Hard shell bed. Large *Perisphinctes*, No. 3150, and *P*. sp., No. 3154, from this bed—workmen. [Also *Cymatosphinctes cymatophorus*, 3301, CDL]	
	4*c*.	Brown earthy grit, *Echinobrissus dimidiatus*	
Vertebriceras	4*d*.	Hard shell bed, clavellate *Trigonia*. [*Nautilus hexagonus* from a loose block of this bed (workman)]. Casts of a large *Gervillia*. Impression of a costate "*Per*. cf. *triplex*" and fragments of a similar form (remanic ?). Lower part of bed brown, decomposed. Lumps of the bed may be recognized on the stone heap by this decomposed part. [*Vertebriceras dorsale*, 2780, CXCVIII, *V*. *vertebrale*, 3234, Vol. III, p. 16, *V*. *rachis*, 2776, 2777, p. 16, *V*. *quadratum*, 2779, p. 17.] Average thickness 4 *a*—*d* about..	2′ 3″
Goliathiceras excavatum cordatiforme etc.	[1] 5.	Grey quartzose Sands, with discontinuous hard layer towards top, and with two hard layers of shelly rock towards bottom. [*Anacardioceras cordatiforme*, No. 3771, Pl. CDXX; *Anacard. excavatum*, No. 2775, Pl. CDLXIII; *Kranaosphinctes kranaus*, No. 2778, Pl. CDXLIII; *Goliathiceras ammonoides*, No. 2773, Pl. CXXXII c]. Large "*P*. cf. *triplex*," 3152, and "*Cardioceras* cf. *suessi*," 3149, from the loose sands, according to workmen. *Per*. 3153, in hard block (workmen). *Pleuromya*, beautiful casts, the same. Exposed about..	3′ 6″

SEQUENCE XII—HORSPATH, OXFORDSHIRE

(Horspath Quarry, near Brittleton Barn)

Hemeræ		*Strata*	*Thickness*
	3.	CORAL RAG. Coralline Rubble Beds, numerous Corals and Cidaris spines	12′ 0″
biplex / *Vertebriceras*	2.	Shell-Bed. Marcham clavellate *Trigonia*, small *Exogyra*. *Arisphinctes ariprepes*, T.A. DXI, purch. from workman; *Chalcedoniceras chalcedonicum*, No. 3601, Pl. CCXCVA	2′ 0″
excavatum ?	1.	Sands with occasional doggers (quartzites). A large *Gervillia*	

The top of the Shell Bed is eroded, and in one place, towards S. part of pit, there is a thickness of only 4 inches of it between Coralline Beds and Sands. At Holton Quarry, about 3 miles E. of Headington Quarry, there are massive limestones rather bare of fossils, attaining a thickness

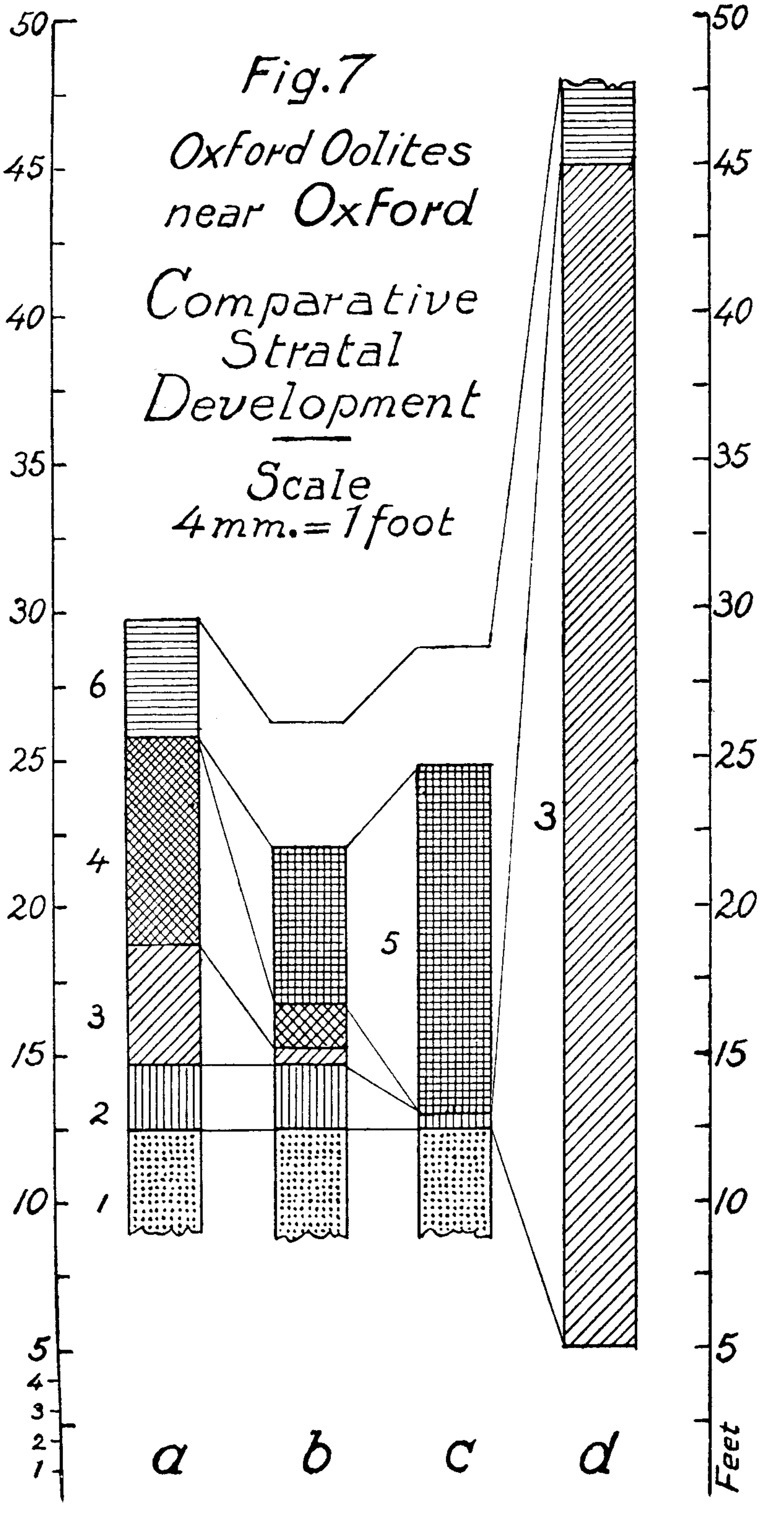


Fig. 7
Oxford Oolites near Oxford
Comparative Stratal Development
Scale 4 mm. = 1 foot
50
45
40
35
30
25
20
15
10
5
4
3
2
1
6
4
3
2
1
5
3
a
b
c
d
Feet

of some 40 feet. Fragments of Ammonites give those of Headington Bed 3, and the whole seems to be a great expansion of the Brown Course. The Limestone quarries of Wheatley, about 3¼ miles E. of Headington Quarry, and of Stanton St. John, about 2½ m. N.E., show a similar facies and similar ammonite fragments or impressions.

TABLE IV — OXFORD OOLITES (ANALYSIS)
(Thicknesses in feet and inches)

Strata	*Localities* Headington	Cowley	Horspath	Halton
White Pendle	4′ 0″			
Coral Rag		4′ 0″ +	12′ 0″ +	
Coralline & Hard	7′ 3″	1′ 6″		
Brown Course (Halton Beds)	4′ 0″	4″		40′ +
Shell Beds	2′ 0″	2′ 3″	4″	
Sands				

TABLE V — OXFORD OOLITES (SYNOPSIS)
(Maxima Developments)

Strata & Localities	*Thicknesses, in feet, approx.*
White Pendle — Headington	4
Coral Rag — Horspath	12
Coralline and Hard — Headington	7
Halton Beds — Halton	40
Shell Beds — Cowley	2
Littlemore Sands — Littlemore	100
Total	165

The geographical distribution of the Ammonite fauna of the Oxford Oolites in the Oxford District varies considerably. Such variation has nothing to do with the original habitats of the species while alive, for the exposures are too close together for that theory to be entertained; but the variation is due to two causes (1) to chemical action since deposition, (2) to penecontemporaneous erosion.

From the Littlemore Sands the lime has been very largely dissolved out. In some cases the sands are quite barren of fossils—any preserved shells have been dissolved away entirely. In other cases, where more lime accumulated, doggers have been formed, which again have in some cases shrunk, perhaps, to partial or almost complete disappearance owing to chemical action. But the failure of these doggers at Headington Quarry (Magdalen Pit) and their presence at Cowley (near Industrial School), and therefore the absence or presence at these places respectively of their Ammonites, is more possibly due to penecontemporaneous erosion, which has removed from the former place the sand and doggers belonging to the upper part of the Littlemore Sands.

Penecontemporaneous erosion has certainly removed, in places, parts of the Shell Bed—as for instance is obvious in different portions of Horspath Quarry. The same cause has affected the Brown Course; but the great thickness of the Halton Beds is, presumably, due to some special cause favouring excessive deposition in the Wheatley-Halton-Stanton St. John-area.

Eastward of this area the limestones of the Oxford Oolites are replaced by Ampthill Clay, which must be the subject of a separate study, for no reliable data as to its fauna are available at present.

But just east of the area, at Field Farm, Worminghall, Buckinghamshire, about 3 miles N.E. of Wheatley, a well-sinking disclosed an interesting section, as follows :—

SEQUENCE XIII — WORMINGHALL, BUCKS
(Well-sinking north of road near Field Farm)

Hemeræ	*Strata*	*Thickness*
Vertebriceras?	5. Whitish Clay	3′ 0″
zenaidæ *mite*	4. WORMINGHALL ROCK. More or less yellow marly sandstone. *Cardioceras* cf. *zenaidæ* ; *Miticardioceras mite*, T.A., CCCLXXV ; *Perisphinctes* cf. *intercedens*, Ilovaïsky ; immense *Gryphææ* and numerous Lamellibranchs	6″
	3. Blue Clay	4′ 0″
rouillieri ?	2. Bluish stone-band with wood. (In a well-sinking at Honeyburghs, Oakley, Bucks, a similar-looking rock yielded thin Cardiocerates—not those of the neighbouring Horton pit	6″
	1. Blue clay with occasional stone. Largish *Gryphææ*, more numerous towards bottom. (The well at Honeyburghs yielded similar *Gryphææ*) A very poor Ammonite fragment, suggesting *Neumayriceras oculatum*	22′ 0″

Bed 5, the whitish clay, may possibly be equivalent to the *Rhaxella* Chert (A. Morley Davies, Kim. Clay and Corallian ; Q.J.G.S., LXIII, 1907, 37), which may be collected from in fields on the east flank of the hill, Woodperry House-Stanton St. John, Oxon, and in shallow pits near Arngrove Farm, Boarstall, Bucks. Its wider extension is shown by Dr. Morley Davies, op. cit., p. 41, fig 2. This chert yields Ammonite fragments and impressions, referable to *Vertebriceras* and something like *Anacardioceras cordatiforme*. It seems to pass into a white clay which occurs in the fields around Oakley Pasture, Bucks, of which the whitish clay of the well at Field Farm may be the base.

The Worminghall Rock would thus come out as the equivalent of the unfossiliferous, perhaps middle part, of Littlemore Sands. It is certainly to be compared with the Ardassie Beds (p. 48).

The Worminghall Rock is of economic importance as a water-bearing bed in a clay country where such beds are very scarce. At Field Farm it gives an abundant supply. It would seem to be the source of supply for the wells at Worminghall village, rather better than 1 mile to the S.E. There the wells are said to be 20 feet deep and, as the ground also drops, the dip may be as much as 30′—35′ in the mile.

A deep well, said to be 80 feet down—possibly somewhat exaggerated, as reports of deep wells often are—is said to yield a fair supply of water at Ickford, Bucks, about another mile from Worminghall in the same direction. It seems probable that the Worminghall Rock is the source of this supply.

Other houses in Ickford obtain water from a shallow river-gravel in which, it is to be feared, their cess-pits are also sunk. The new Government houses have an elaborate cess-pit system, but the only means of ultimate disposal is into the gravel; yet this gravel-bed is the water supply, draining into, and stored in, a dummy well which penetrates some 25 feet into Prionodoceratan clays (T.A., IV, p. 37). So *Prionodoceras* is about 45 feet above Worminghall Rock, more than enough room for Ampthill Clay. To strike a deep source of water the well would have to be sunk this 45 feet further, and, to keep it uncontaminated by sewage, special precautions would have to be taken to prevent inflow of the gravel-water.

Mr. W. J. Arkell, who has collected successfully from the Oxford Oolites of Wiltshire and Berkshire, has very kindly contributed the following Sequences as characteristic of the development to the strata to the S.W. of Oxford.

It has not been possible to make much headway with the identification of the Ammonoids, especially the Perisphinctids, on account of shortness of time. The difficulty of identifying Perisphinctids is great enough in any case: it is made far more so because, too often, original figures fail in not giving the true identification marks, their suture-lines not having been properly delineated, though it is obvious that, in many cases, the suture-lines could have been obtained with very little trouble. It is hoped, however, to be able to figure the principal examples of these Ammonoids as this work progresses.

OXFORD OOLITES—WILTS & BERKS
Representative Sequences
by
W. J. Arkell

(The capital letters on the right hand are to mark corresponding beds in each Sequence)

Sequence XIV—Highworth, Wilts, I

The numbers in the left-hand column refer to beds in my MS. descriptions of the old quarries and sand-pits north of Redlands Court, Highworth. Besides Ammonites, only peculiar or useful fossils mentioned

		Strata	*Fauna*
		Kimmeridge Clay, with ironstone band about 20′ from base, proved in Red Down boring. Southwards the ironstone thickens into the "Upper Calc. Grit" of the Geological Survey	
J.	[18].	White limestone, with 3 clay bands	
I.	17.	Massive Coral reef, seen in boring on Red Down; total thickness with bed above, 24′	*Isastraea*; *Thamnastraea*; *Thecosmilia*; *Cidaris florigemma*

SEQUENCE XIV, contd.

		Strata	Fauna
H.	16.	PUSEY FLAGS. False-bedded, fissile sandstone, with white oolite grains 2′	
G.	15.	HIGHWORTH GRIT. Yellow sand, passing gradually into 6′	
F.	14.	Clay 5′	*Ostrea solitaria*
E.	13. 12. 11.	URCHIN MARLS. Coarsely oolitic marls, two hard courses, one soft 4′	Perisphinctid, sp. S; *Echinobrissus scutatus*, very abundant
D.	10. 9. 8.	Shelly limestones, in two courses, with marl parting 2′ 1″	Perisphinctids, spp. D, G, U; Cardiocerates, spp. D, H; *Cerithium muricatum*
	7.	Rolled Thecosmilian Coral Bed 1′ 5″	*Thecosmilia* sp. *Astarte ovata*
	6.	Shelly limestone 9″ to 1′	
	5.	Rolled Thecosmilian Coral Bed 8″	*Thecosmilia* sp.; *Astarte ovata*; *Trichites*; *Cerithium muricatum*; *Cidaris smithii*
	4, 3.	Shelly limestones & marl partings 2′ 10″	
B.	2.	Intensely hard blue-centred grit. av. 1′ 9″	
A.	1.	Yellow sand, with doggers, seen at Highworth Railway Station to 16′, but proved to 26′—30′ in three wells at Highworth and in the Red-Down boring, with varying number of stone bands	*Vertebriceras*; *Aspidoceras* sp. B; in dogger 3½′ from top
		Oxford Clay, proved in Red Down boring and wells, to 45′	

SEQUENCE XV—HIGHWORTH, WILTS, II
(One mile to the south-east)

The numbers in the left-hand column refer to beds in my MS. description of the new quarry at Hangman's Elm. Besides Ammonites, only peculiar or useful fossils mentioned.

		Strata	Fauna
I.	[13].	Massive reef seen on Friars Hill; near Upper Farm; and a mile south on Shrivenham Road	*Isastraea*; *Thamnastraea*; *Thecosmilia*; *Cidaris florigemma*; Perisphinctid sp. V. (Shrivenham Road)
G.	[12].	HIGHWORTH GRIT, seen below reef on Friars Hill	
F.	[11].	Clay in old pit, 50 yards to west	
E.	10. 9.	Coarsely oolitic marl, varying hardness = Base of the Urchin Marls of Marcham 1′ 6″ seen	Perisphinctid, sp. S.; *Echinobrissus scutatus* very abundant

SEQUENCE XV (continued)

		Strata	*Fauna*
D.	8. 7. 6.	Limestone, in two courses, with marl parting 4′ 4″	Perisphinctids, spp. B, C, D, E, F, [B, *P. helenæ* De Riaz; D, *P. antecedens* Salfeld; F, *Arisphinctes*, cf. *cristatus* Klebelsberg, S.B.]; *Aspidoceras* sp. A (basal foot of 6); Cardiocerates spp. C, cf. D, E; *Nautilus hexagonus*; *Trigonia meriani*; *T. elongata*; *Cerithium muricatum*. A few *Thecosmiliæ* in basal foot of 6.
	5.	Red, rubbly limestone, full of prostrate *Thecosmiliæ* 8″	*Thecosmilia* sp. *Astarte ovata*, *Trichites*
	4.	Thecosmilian Coral Rag. Corals in position of growth. Much clay, full of *Exogyra* 2′ 8″	*Thecosmilia* sp. *Cidaris smithi*
C.	3.	Pebble Bed, as at Kingston c. 4″	
		Eroded surface	
B.	2.	Intensely hard blue-centred grit 0 to 2′	Cardiocerate sp. A, (= *Goliathiceras microtrypa* ?); *Nautilus* sp. (non *hexagonus*)
A.	1.	Yellow sand with doggers—seen to 6′, but proved to 14′ in a well at Upper Farm	Calcitic *Natica*-casts in the doggers, like those at Cumnor
	[1b].	"Marl," proved in well at Upper Farm 6′	
	[1a].	"White sand and soft sandstone" proved to 2′ in well at Upper Farm, resting on "Blue (Oxford) Clay," 22′	

SEQUENCE XVI—KINGSTON BAGPUIZE, BERKS

The numbers in the left-hand column refer to beds in my MS. description of the Lamb Inn pit, and are the numbers with which the specimens are marked. Besides Ammonites, only peculiar or useful fossils mentioned.

		Strata	*Fauna*
I.	[12].	CORAL RAG seen at Lower Lodge Farm to rest on 11	*Isastraea*; *Thecosmilia*
H.	11.	PUSEY FLAGS. False-bedded oolitic and pisolitic flags: at Pusey 12′	*Hemicidaris* spines at Pusey
G.	10.	HIGHWORTH GRIT and clay;	
F.	9.	yellow sand, with some oolitic rubbly bands, passing down into clay 8′	
		Marked eroded surface	
E.	8.	Greyish white oolite = Base of Urchin Marls at Marcham c. 1′	

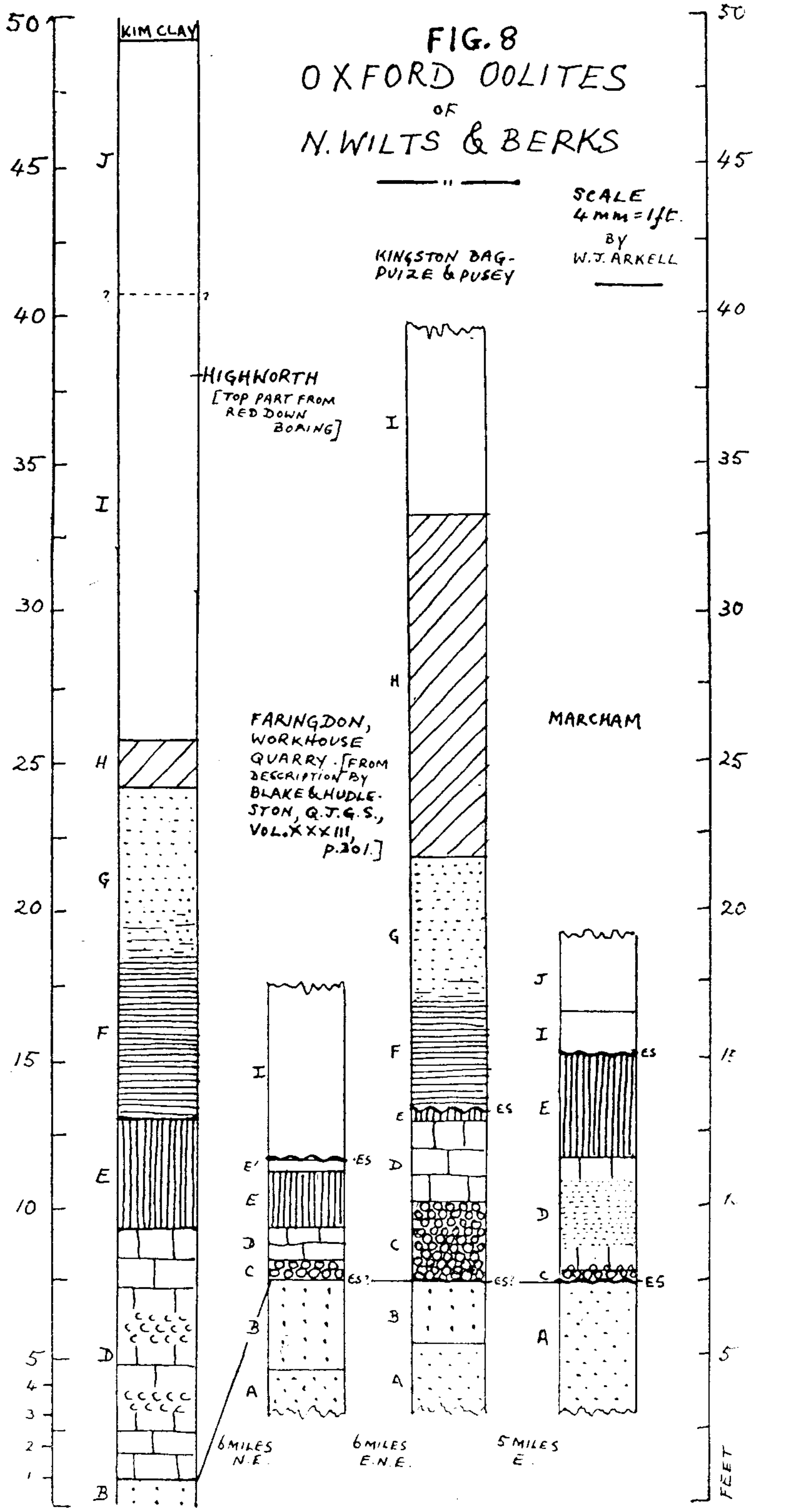


FIG. 8
OXFORD OOLITES
OF
N. WILTS & BERKS
SCALE
4 mm = 1 ft.
BY
W. J. ARKELL
KIM CLAY
HIGHWORTH
[TOP PART FROM RED DOWN BORING]
FARINGDON, WORKHOUSE QUARRY. [FROM DESCRIPTION BY BLAKE & HUDLESTON, Q.J.G.S., VOL. XXXIII, p. 201.]
KINGSTON BAGPUIZE & PUSEY
MARCHAM
6 MILES N.E.
6 MILES E.N.E.
5 MILES E.
FEET
ES

Sequence XVI (continued)

		Strata	Fauna
D.	7.	Non-oolitic marl 4″	Perisphinctid sp. B, [*P. helenæ*, De Riaz, S.B.]
	6.	*Trigonia* Bed of Blake & Hudleston 1′ 6″	Perisphinctids spp. A, B, C ?, D, J. L, M; (L = *Arisphinctes maximus* ? M = *Arisphinctes ariprepes* ?) ; [D = *P. antecedens*, Salfeld, S.B.] *Vertebriceras dorsale* ; *Trigonia meriani* ; *T.* cf. *clavellata* ; *T. perlata* ; T. cf. *triquetra* ; *Astarte ovata* ; *Trichites* ; *Cerithium muricatum* ; *Thecosmilia* sp. (rare fragments)
	5.	Marl 3″	
	4.	*Gervillia*-cast Bed 6″ to 8″	Perisphinctid sp. K (= *Kranaosphinctes* ?)
C.	3.	Pebble Bed, full of white pisolitic pellets, and hard pebbles, of smooth surface. Soft above, hard below 2′ 8″	Perisphinctids spp., B, G, P, Q, R. (P & R = *Cymatosphinctes* spp. ?) *Aspidoceras* sp. C ; *Trigonia triquetra*
B.	2.	Intensely hard blue-centred grit 0 to 2′	
A.	1.	Yellow sand, with a few doggers near top	

Sequence XVII — Marcham, Berks

The numbers in the left-hand column refer to beds in my MS. description of the large quarry nearest the village. The thicknesses are taken at the southern end, where most of the beds attain their maximum development. Besides Ammonites, only peculiar or useful fossils mentioned.

		Strata	Fauna
J.	12.	White Pendle, as at top of Wheatley and Headington quarries. White poorly fossiliferous limestone 2′ 6″	
I.	11.	Coral Rag. The only constant bed in the quarry 1′ 9″	*Isastraea* ; *Thecosmilia* ; *Cidaris florigemma*
E.	10.	Urchin Marls ; Oolitic marl with race, full of Echinobr. 8″	*E. scutatus* ; *Pygaster umbrella*
	9.	Consolidated ditto, without race 1′ 8″	*E. scutatus* ; *P. umbrella*
	8.	Same as 10, without race 1′	Perisphinctid, sp. T ; *E. scutatus*; *P. umbrella*
	7.	Same as 9. 1′	*E. scutatus*
	6.	Same as 8. 4″	*E. scutatus*
D.	5.	*Trigonia* Bed. Hard limestone, packed with Trigoniæ and other fossils 1′	*Trigonia perlata* ; *T. triquetra* ; *T. hudlestoni* ; *T. meriani*, and other species ; *Astarte ovata*
	4.	Interlaminated sand and clay 2′	
	3.	Irregular masses of hard white limestone, full of fossils, the *Trigoniæ* as casts 8″—1′	Casts and moulds of clavellate and costate *Trigoniæ* ; *Trichites*

SEQUENCE XVII (continued)

		Strata	Fauna
C.	2.	Irregular seam of debris, composed of shells, serpulæ, pebbles of lydite & white limestone, and lumps of Calc. grit, denoting erosion 4″	
A.	1.	False-bedded calcareous grit, in bands of sand, sandstone, and doggers. In adjacent quarries similar very variable beds are exposed to 15′, with occasional marl bands, which contain most of the fossils. Base reached at 34′ 4″ in well at Cothill School	Perisphinctid, sp. W; *Aspidoceras faustum*; *A. catena*; *Anacardioceras excavatum*; *Nautilus hexagonus*; *Belemnites abbreviatus*, typical form; *Teleosaurus* vertebrae

Traced northwards round the quarry, great changes are seen in the strata. In about 50 yards both Trigonia-beds disappear, and the sandy bed between them (Bed 4) thickens to 3′ 6″. At the same time, the separate beds of the Urchin Marls lose their identity, and together thin out from 4′ 8″ to 1′ 4″.

The Comparative Diagram (Fig. 8, p. 58) shows the chief sections along the Faringdon Ridge. I have only used one of the Highworth Sequences, and have introduced my own interpretation of a description by Blake & Hudleston of a valuable exposure at Faringdon, long since completely obliterated. This description was made in 1877 (Q.J.G.S., XXXIII, 301, 302), but it is so admirable that every bed is unmistakable. It fills a gap in the otherwise equally-spaced sections along the Faringdon Ridge. Its "Calcitic Limestone," which I have marked E^1, occurs also at Shellingford, Berks.

It may be noted that there is a gradual thickening of the shelly strata between the Coral Rag and the Lower Calcareous Grit, from the 1′ Shell Bed at Horspath to 30′ near Highworth. This is compensated by a thinning of the Lower Calcareous Grit from 50′ and 60′ in wells about Oxford to 30′ at Highworth. At Faringdon, where the westward thinning of the Lower Calcareous Grit is interrupted by a local expansion to 70′ (proved in the boring at the Eagle Brewery, Faringdon), the shelly beds are reduced to 4′ 3″. The reduction here is due in part to the absence of the upper divisions, and in part to a general thinning of the remainder.

The highly fossiliferous shelly beds of the Faringdon Ridge, described in the four Sequences, form a small province of their own. They are capable of easy correlation within that ridge, but they taper out rapidly east and west, and are replaced at both ends by non-shelly, non-oolitic limestones, with which their correlation is still uncertain. A change occurs west of Highworth, into the non-oolitic, poorly fossiliferous limestones of Blunsdon and Purton, comparable with, and as abrupt as, that near Oxford. At Tockenham, near Wootton Bassett, the Coral Rag and Lower Calcareous Grit are once more separated only by a 1′ Shell Bed, with Perisphinctids and *Trigoniæ*, and the quarries closely resemble some near Horspath. This is the last glimpse that can be obtained of the Highworth-Marcham type of deposit; south-westward further changes set in, almost as fundamental as the sudden transformation into clays east of Holton, and its place is taken by the cream-coloured oolites, pisolites, and freestones of Goatacre, Calne, and North Dorset. These contain few Ammonites or other decisive fossils, and their age in relation to the Berkshire rocks remains to be proved.

The interest in the detailed study of the rocks of the Faringdon Ridge lies in the possibility of establishing the rather thin divisions as representatives of thick deposits elsewhere; for the extraordinary abundance, variety and rapid vertical change of the fossils suggest that the greater part of the series consists of a number of remanie beds.

Mr. J. Pringle, F.G.S., has kindly forwarded for publication the following section of the beds exposed in Littlemore Railway-cutting, south of Oxford. It is a section remarkable in various ways, and it gives indications of ammonoid faunas not hitherto noted in British strata. The naming of the Ammonoids, in the main fragmentary specimens received just on the eve of going to press, must be considered provisional. They are important, as indicating what possibilities there are, to encourage further research.

OXFORD OOLITES — S. OF OXFORD

BY

J. PRINGLE, F.G.S.

SEQUENCE XVIII — LITTLEMORE, NEAR OXFORD

Railway-cutting Quarry

Hemeræ		*Strata*	*Thickness*
(*gerontoides* ?)	27.	Greyish-white sandy limestone, slightly oolitic, with *Perisphinctes* cf. *gerontoides* Siemir.; seen.. ..	0′ 6″
	26.	Brownish-black clay with *Exogyra nana*	0′ 6″
	25.	White weathering argillaceous limestone	0′ 5″
	24.	Brownish-black clay	1′ 3″
	23.	White weathering argillaceous limestone .. 5″ to	0′ 10″
	22.	Brownish-black clay	1′ 5″
(*linki* ?) (*bifurcatus* ?) *tizianiformis*	21.	White weathering argillaceous limestone in six layers, separated by thin, irregular seams of brownish-black clay; crowded with *Exogyra nana*, *Serpula intestinalis*, *Perisphinctes* cf. *linki* Choffat in top layer; *Ataxioceras* cf. *bifurcatus* Siemiradzki, in middle layer, and *Perisphinctes tizianiformis* Choffat, at base of bed	2′ 10″
	20.	Brownish-black clay	1′ 0″
	19.	White weathering argillaceous limestone	0′ 5″
	18.	Brownish-black clay	0′ 7″
	17.	White weathering argillaceous limestone	0′ 3″
	16.	Brownish-black clay	0′ 10″
bolobanowi	15.	White weathering argillaceous limestone, in five layers, separated by thin seams of clay. *Perisphinctes* cf. *bolobanowi* Nikitin, at base	2′ 0″
	14.	Brownish-black clay, crowded with *Exogyra nana*. About middle of bed is an irregular band of argillaceous limestone, inconstant in thickness..	2′ 0″
	13.	White weathering argillaceous limestone	0′ 5″

SEQUENCE XVIII—(continued)

Hemeræ		*Strata*	*Thickness*
	12.	Brownish-black clay	0′ 3″
	11.	White weathering argillaceous limestone	0′ 5″
	10.	Brownish-black clay	0′ 11″
	9.	White weathering argillaceous limestone	0′ 8″
	8.	Brown shelly marl	0′ 3″
Aspidocerate	7.	Shelly argillaceous limestone with *Aspidoceras sp.* ..	2′ 0″
	6.	Buff shelly sand, crowded with small specimens of *Pecten fibrosus* J. Sow. and *Exogyra nana*	10″ to 1′ 0″
	5.	Brownish-grey marly limestone, variable in thickness.	6″ to 1′ 0″
	4.	Brown shelly sand with *Pecten fibrosus* J. Sow. ; resting on irregular surface of Bed 3	1′ 3″
antecedens *martelli* *excavatum*	3.	Dark grey gritty limestone, containing in upper part *Perisphinctes* cf. *antecedens* Salfeld and *Perisphinctes* of *wartae*-style. At base is a shelly layer with small pebbles of chert and quartzite. *Perisphinctes* aff. *martelli* (Oppel) and *Anacardioceras excavatum* (J. Sow.) ; cemented firmly on to Bed 2	2′ 0″
	2.	Dark grey calcareous sandstone, probably the indurated top of the underlying sands	0″ to 0′ 10″
	1.	Buff sands, with spherical and elongated masses of hard grey calcareous sandstone on three levels. The middle band forms a fairly constant layer, 1 ft. to 1 ft. 3 inches thick	15′ 0″

Exogyra nana (J. Sow.) is exceedingly abundant in the upper part of the section, ranging from Bed 6 to Bed 26. The evenly bedded character of the strata is interrupted at one point by a mass of rudely stratified nodular limestones ; the surfaces of the nodules are covered by clusters of *Exogyra nana* and *Serpula intestinalis*. At the base of Bed 3 there are signs of erosion, and it is possible that the specimen of *Anacardioceras excavatum* has been derived.

So far as can be checked, the beds exposed in the quarry do not vary much when traced in a westerly direction along the line of strike. At Bagley Wood, in Berkshire, two miles to the west of Littlemore, a quarry exhibits an almost identical section. Marked changes in lithological characters are found in the direction of dip.

LITTLEMORE SANDS. A mistake in regard to the thickness of these Sands given in Table IV, p. 53, has to be corrected. My original estimate was about 50 feet for these Sands east of Oxford. Then, just as the page was passing through the press, information from Cowley spoke of a well sunk there which " went down 114 feet before getting water " : it implied that this thickness of sand was penetrated, and, therefore, alteration to 100 feet seemed reasonable. But the information should have been : " went down 114 feet without getting any water." Mr. J. Pringle informs me that clay was struck at 59 feet, but no water was obtained. This gives, therefore, 59 feet for Littlemore Sands. But, as the well does not begin at their top, some 10 feet may be added, making the possible thickness of the Littlemore Sands some 70 or more feet. About 15 feet of this is to be seen in the Littlemore Cutting; but the workmen say that they have gone much deeper at times in search of silver sand—perhaps another 10 feet.

Table IV, p. 53. From this Table were inadvertently omitted the numbers of the Beds from 1 to 6 upwards and the lettering of the localities from a—d to correspond with the figures and letters of Fig. 7, p. 52. Holton should have been written instead of Halton. Holton Quarry is also known as Lye Hill Quarry. Two Ammonites have been obtained from there which have massive ribs on outer whorls: they may possibly prove to be *Perisphinctes parandieri*, de Loriol.

The Oxford Oolites of the Dorset Coast now claim attention.

SEQUENCE XIX — WEYMOUTH DISTRICT

As given by Blake & Hudleston, Q.J.G.S., XXXIII, 1877, 262–275, with interpretative notes in brackets.

[*Hemeræ*]	*Strata*		*Fauna*
	10. Abbotsbury Ironstone (p. 273) [inverted]	35′ 6″	
	e. Ferruginous ironstone ..		*Exogyra virgula*
	d. Dark green rock		
	c. Yellow sands		
[*cymodoce*]	b. Suboolitic grits		*Ammonites decipiens*
	a. Brachiopod Beds		*Waldheimia lampas. W. dorsetensis* *Rhynchonella corallina*

[From the Abbotsbury Iron-ore come small *Raseniæ*. *Am. hector*, cit. p. 274, Hudleston Coll., Dorset County Museum, is a Perisphinctiod with wide-spaced ribs, compare *Am. witteanus* Oppel. The form is, perhaps, Salfeld's *Rasenia pseudowitteana*, at present a nomen nudum. From the suboolitic grits Salfield quotes *Rasenia thermarum*, *R. pseudo-witteana*, *R. uralensis*, *R. cymodoce* (Ob. Jur.; N. Jahrb. Min. Beil.-Bd. XXXVII, 200)]

	9. Kimmeridge Clay [base] (272)	4′ 8″	
	b. *Exogyra* bed		*Exogyra nana*
[*inconstans*]	a. Blue Clays, *Rhynch.* Bed ..		*Rhynchonella inconstans*
	8. Upper Corallian (272) ..	11′ 4″	
[*baylei*]	d. Upper Coral Rag		*Am. cymodoce*
	c. Thin clay		*Serpula*
	b. Ferruginous clay		
	a. Waxy clay		Corals

[*Ammonites cymodoce*, Hudleston Coll. and labelling in the Dorset County Museum, from the "Coral Rag, Ringstead," is *Pictonia densicostata*, Salfeld, compare T.A. DXXXIII. The order of 9, 8 is that given by Blake & Hudleston, but it seems doubtful]

SEQUENCE XIX—(continued)

Hemeræ	*Strata*		*Fauna*
[*Ringsteadia*]	7. Sandsfoot Grits	26′ 0″	
	c. Red Grit		*Am. decipiens*
	b. Ferruginous Shale		
	a. Sands and Shales		*Ostrea deltoidea*
	[The Red Grit yields numerous *Ringsteadiæ*]		
	6. Sandsfoot Clay	18′ 0	*Am. plicatilis*
[*ingens*]	5. *Trigonia* Beds	c. 40′ 0.	*Am.* cf. *eupalus*
[*antecedens*]	[From beneath the cliff at the western end of Ringstead Bay fragments of a big plicatiloid Perisphinctid in a sandstone matrix were brought to me : it is suggestive of *Toxosphinctes ingens*, compare T.A. CLXXXIV. This is, perhaps, the form which Blake & Hudleston call *Am.* cf. *eupalus*. From a similar bed at Sandsfoot Castle Dr. Salfeld quotes *Perisphinctes* cf. *wartæ* mut. *antecedens* (op. cit. 201)]		
[*martelli*]	4. Osmington Oolites (265) ..	22′ 0″	
	[Salfeld (op. cit. 204) mentions "typical examples of *Perisphinctes martelli*" in the Nat. Hist. Mus., South Kensington, London, from these strata]		
	3. Bencliff Grit (264)	21′ 0″	
	2. Nothe Clays (264)	40′ 0″	*Am. cordatus*
[*Goliathic.*]	1. Nothe Grits (263)	30′ 0″	*Am. cordatus*

A point which comes out plainly in these investigations is that the Coral Bed of the Dorset Coast is of quite different date from that of the Coral Rag of the Oxford District—a point already made by Blake & Hudleston, but their lithological method of working without a palaeontological time-table did not bring out its significance.

The Nothe Grits are conspicuously ammonitiferous, and are capable of much more division. This is given in the following Sequence. Similar detailed research in the other beds of Oxford Oolites in the Weymouth District should yield good results.

SEQUENCE XX — OSMINGTON AREA
(From Jordan Cliff, Preston, to E. of Radcliff Point)

Hemeræ	*Strata & Fauna*
	11. Nothe Clays, presumably. Marls or marly rock of a bluish colour.
Goliathiceras excavatum	10. PRESTON GRIT. A band, about 6 feet thick, of calcareous grit, yellow outside, bluish within, forming an outstanding feature in the cliff west of Radcliff Point : it has a flat top. Great cubes of this rock fall on to the beach, where they exhibit a fair ammonite fauna, often, however, very difficult to extract. *Anacardioceras excavatum* and forms allied—many shown in section : by the difference in thickness of inner whorls and in contour of periphery it is seen that there are several species. *Goliathiceras* spp. ; *Aspidoceras*, with large tubercles ; very large *Gryphæa dilatata*.

SEQUENCE XX—(continued)

Hemeræ — *Strata & Fauna*

9. RADCLIFF GRIT. Yellow sands, with large rounded doggers in lower part. These sands make, with the overlying bed, a sort of double line, very conspicuous in the cliff west of Radcliff Point.

8. Marly Beds.

cordatum ? 7. JORDAN GRIT. Grit Beds of a bluish colour, showing interlacing branchings very conspicuously—largish blocks on shore. *Trigonia* similar to a species abundant at Marcham. Lower part of these grits shows blocks of fine-grained, blue, argillaceous limestone, obviously derived. A lump of this lower part, identifiable by the presence of a derived block, showed a thin ammonite of *Am. excavatum*-form. In a derived block was a plicatiloid Perisphinctid: cf. Red Beds below, from whence these blocks were, perhaps, derived.

suessi 6. HAM CLIFF GRIT. Grit Bed, rather soft. *Cardioceras suessi ?* and another—a form conspicuously keeled with lateral knobs, comparable with forms from Honeyburghs, Oakley, Bucks (p. 54, above).

5. Bluish-yellow arenaceous beds.

The above grit beds, Nos. 5–10, are Blake & Hudleston's Nothe Grit; but for correlation purposes it seems advisable to divide them up further, and to distinguish them by the names now suggested. Even then the 6 foot mass of Preston Grit is, possibly, of more than one date.

intercedens ? *rouilleri ?* 4. THE RED BEDS. Clays with reddish brown argillaceous nodules (blue-centred) and a good deal of iron-staining—hence, perhaps, the name Radcliff. The beds are on sea-level at the Point. A fragment of a fairly large plicatiloid Perisphinctid, with flattish venter, very red in colour, on sill of cottage window in Preston; another, very worn, on beach at Radcliff Point; another, in clay, Jordan Cliff; a thinner form on beach, Jordan Cliff; a stout Cardiocerate of a red colour (*Cardioceras cordatum* A; de Loriol, 1898, II, 1, and compare *Card. schucherti*, Reeside), S.B. Coll. 4295, on beach, Jordan Cliff. From Hudleston Collection, now in University College, Swansea, a *faustum* specimen like *Aspidoceras faustum*, labelled from Radcliff, evidently from the Red Beds.

3. JORDAN CLIFF BEDS. Clays with large *Gryphæa dilatata* to be seen in Jordan Cliff, and also to the east of Radcliff Point. There appear to be two or more beds:—

hoplophorus *c*. The upper dark, with a big Peltoceratid, like *Am. constantii* (S.B. Coll. 4255, Pl. DLXIV);

praecordatum *cardia* *b*. A lower, somewhat lighter set of clays, containing Cardiocerates, mainly crushed, suggesting the fauna of the *Cardioceras* beds of Horton-cum-Studley, Oxfordshire, and perhaps more;

SEQUENCE XX—(continued)

Hemeræ	*Strata & Fauna*
ordinarium?	*a.* A third bed is possibly shown by a galeatiform Quenstedtocerate-like Ammonite (S.B. Coll. 4267) found just above the patellate layer.
	2. PATELLATE LAYER. A thin, brown, argillaceo-calcareous layer, not in nodule form, but as a flat seam in Ham Cliff: it forms a conspicuous datum line.
lamberti	1. Tidemoor Point Beds, cf. T.A. IV, 41: *Lamberti*-Beds. East of Radcliff Point, underneath the big faulted mass, the lowest clays show various species of *Bourkelamberticeras* (including flexicostate forms, cf. *A. flexicostatus*). Kosmoceratids and *Putealiceras?*

The *lamberti* forms are mainly crushed, but sometimes are pyritized. All the Kosmoceratids found are more or less pyritized, and are quite small. Thin, almost smooth oxycones are found in very fragile condition: they have much likeness to *Oppelia villersensis*, but they appear to possess *lamberti*-like inner whorls.

A point for investigation in the Weymouth district is the position of the bed of bluish calcareous clay from which came *Sagitticeras sagitta* (T.A. III, CCLX and p. 19). The matrix suggests the Red Beds, perhaps; but associated with it, at least with somewhat similar matrix, are forms of *Vertebriceras:* they would be expected later than the Preston Grit, according to the evidence of the Oxford district.

Now comes for consideration that part of the Cardioceratan which is usually argillaceous, and hence is often reckoned as the top of the Oxford Clay. Specimens in collections show that deposits of the following, presumably distinct, dates have to be allowed for. Certain of these have been already alluded to (T.A. IV, pp. 43-48)—the following are some additions. The sequence is only suggested—there is little actual proof; but see T.A. III, p. 10, where also other localities are given.

SEQUENCE XXI—CARDIOCERATAN AGE (early)

Hemeræ	*Fauna (part)*	*Formation & Locality*
vernoni	*Klematosphinctes vernoni*	Oxford Clay, Yorkshire
oculatum	*Neumayriceras oculatum*	Oxford Clay, Yorkshire
dieneri	"*Cardioceras*" *dieneri*	Light clay, Purton, Wilts (A.M.D.)
hoplophorus	*Peltomorphites hoplophorus*	Jordan Cliff, Weymouth
	Species like *Am. constantii*	Cowley Fields, Oxford, whitish clay
Plasmatoceras	Fine ribbed Cardiocerates with aspect of *C. lineatum* Salfeld (Zeit. d. Geol. Ges. LXVII, 1915, XVII, 10), but with more definite primary ribs. Genotype, No. 30524, M.P.G., London.	L.C.G.-Oxf. Clay border:— Bowood, Wilts, in whitish clay Purton, Wilts, light clay (A.M.D.) Brill, Bucks, rail.-cuttings, bluish clay.

SEQUENCE XXI—(continued)

Hemeræ	*Fauna (part)*	*Formation & Locality*
arduennensis	*Peltoceratoides arduennensis*	Cowley, Oxford
	Peltoceratoides torosus	Isle of Skye
præcordatum	Fine-ribbed Cardioceratesates called *tenuicostatum*; possibly several species and more than one horizon	Studley, Oxfordshire, in well (A. M. D.) St. Clements, Oxford Weymouth
cardia	*Cardioceras cardia*	Weymouth; Horton Brickyard, Oxfordshire

The difficulty of ascertaining the true sequence is due to two causes—(1) certain deposits of the Cardioceratan (the Lower Calcareous Grit) are poorly fossiliferous on account of preservation-failure and exposure-failure, (2) early deposits of Cardioceratan strata, beds which precede the Lower Calcareous Grit, are only found patchwise in certain favoured localities—penecontemporaneous erosion having removed so much of late Vertumniceratan and early Cardioceratan deposits. The different faunas which even closely approximate localities yield is evidence for that. Professor A. Morley Davies has a good illustrative diagram of this, showing the overstep (Zones of Oxford . . Clays; Geol. Mag. (6) III, 399); and there is yet another big overstep between what he calls the *cordatum* and pre-*cordatum* zones—strata with the *arduennensis* fauna come in here at Cowley, which is between Abingdon and Wheatley of his diagram; and there are other beds in other places which have to be brought in about at that position.

A summary of results in the form of a list of dates of the British deposits in the areas of Scotland, Yorkshire, Oxfordshire, including neighbouring counties as well as Wiltshire, and the Dorset Coast, is now presented in Table VI.

TABLE VI—OXFORD OOLITES—BRITISH

PERISPHINCTEAN & CARDIOCERATAN, COMPARATIVE FAUNAS

Scotland	*Yorkshire*	*Oxfordshire*	*Dorset*
	Am. varicostatus	gerontoides ?	
	Am. varicostatus-plicatilis	linki ?	
		bifurcatus	
	Am. plicatilis		
		tizianiformis	
	cawtonense		
		bolobanowi	
		Aspidocerate	
	maltonense		
	ingens		ingens ?
	pickeringius		
Cf. wartae ?	antecedens	antecedens	antecedens
	martelli	biplex	martelli
	Cardiocerate		

TABLE VI—(continued)

Scotland	*Yorkshire*	*Oxfordshire*	*Dorset*
	Vertebriceras	Vertebriceras	Vertebriceras
	Cymatosphinctes		
	chalcedonicus	chalcedonicus	
Goliathiceras	Goliathiceras	Goliathiceras	Goliathiceras
Kranaosphinctes	Kranaosphinctes		
excavatum	excavatum	excavatum	excavatum
cordatum	cordatiforme	cordatiforme	
	sagitta [Tornquistes]		
	Am. cordatus [Cardiocerate]		
acuticostatum	acuticostatum		Aspidocerate (large knobs)
excavatum (costate)			
zenaïdæ		zenaïdæ	
mite		mite	cordatum [mite ?]
rouilleri		rouilleri	rouilleri ? [faustum]
vernoni	vernoni		
dieneri		dieneri	
	oculatum	oculatum ?	
	williamsoni	constantii ?	hoplophorus
		Plasmatoceras	
Korythoceras	Korythoceras ?		
torosus		arduennensis	
suessi ? [Cardiocerate]	Cardiocerate	Cardiocerate (Studley, well)	
praecordatum	praecordatum	praecordatum	praecordatum
cardia	cardia	cardia	cardia

The results work out fairly well, allowance being made for nomenclature-failure, especially in the case of the Yorkshire specimens. It is, for instance, difficult to interpret the citations of Ammonites [Perisphinctids] from Yorkshire beds near the close of the Corallian, and it is doubtful if they can be reckoned as equivalent to those in the high strata of the Oxford district (Littlemore). Then it appears to be necessary to put such records as *A. williamsoni*, of Yorkshire, *A. constantii*, or near, of Oxfordshire, and the new large Peltocerate of the Dorset Coast as marking one date—a date of giant Peltocerates which can be traced right across Europe into Moravia, and on into India. But the trouble of giving to *williamsoni* the same date as large Peltocerates is that it brings Yorkshire fossils, such as *Amm. vernoni* and *oculatum*, which come from a blue marly clay called Oxford Clay, into a position later than beds which have been assigned to Corallian. This may be the case; but, on the other hand, the explanation may be faunal repetition—the same phenomenon as is seen in the occurrence of Aspidocerates at successive but separated levels in the strata of Vertumniceratan, Cardioceratan, Perisphinctean and later Ages. Blake & Hudleston draw attention to what is really this phenomenon (Corallian; Q.J.G.S., XXXIII, 1877, 392), citing four distinct forms of *Am. perarmatus*, as they call it, from four well-separated Corallian horizons, ranging from early to late. This phenomenon of faunal repetition is quite common. Notable cases are the repetition of Strigoceratidæ in strata of Ludwigian, Sonninian, Stepheoceratan and

Parkinsonian Ages (see T.A. V, Plates CDLXVI—CDLXXII, 1924) and the repetition of *pallasianus*-like Ammonites on the Kimmeridge-Portland border. Such repetition may easily account for certain incorrect stratal correlation, and it has to be allowed for as quite a likely source of error in the compilation of the following Table (VII), especially in regard to deposits widely separated geographically.

TABLE VII—OXFORD OOLITES—GEOGRAPHY

Preservation of Deposits of Given Dates

Hemeræ (*see Tab. VI*)	*Europe*	*Asia*	*America*
gerontoides	Portugal ; Switz.		
linki	Portugal		
bifurcatus	Swabia		Mexico ?
tizianiformis	Portugal		
cawtonense			
bolobanowi	Russia		
Aspidocerate	France; Moravia	Moghara ?	Mexico ?
maltonense			
ingens	Switzerland ?		
pickeringius	Switzerland		
antecedens	Hanover	Kutch; Moghara	Bolivia? Mexico ?
martelli	France		
Cardiocerate			
Vertebriceras	Lithuania		Wyoming
Cymatosphinctes			
chalcedonicus		Kutch ? (S. polyphemus ?)	
Goliathiceras	Russia ?		Wyoming
Kranaosphinctes	Moravia	Kutch	Bolivia
excavatum	Russia		Wyoming ; Alaska
cordatiforme			
Sagitticeras	Switzerland ?		Wyoming
Tornquistes	Switzerland	Kutch ?	
Cardiocerate			
acuticostatum	Moravia	Kutch	
excavatum (costate)	Russia ; Lithuania		
zenaïdæ	Russia		
mite	Lithuania		
rouilleri	Ardennes ; Russia		
cf. faustum	France		
vernoni	Switzerland		
dieneri	Moravia		
oculatum	France ; Bavaria		
hoplophorum	Moravia	Kutch	
Plasmatoceras	Lithuania		
Korythoceras	Switzerland ?		
arduennensis	France	Kutch	
suessi	France		
præcordatum	France		
cardia	Switz. ; Russia		Alaska, etc.

This Table (VII) gives a slight sketch of the geographical preservation of the strata of the different dates of the Oxford Oolites (Perisphinctean-Cardioceratan Ages). It is only a preliminary sketch: fuller details are being prepared for issue in the next volume.

The interesting points about this sketch are the almost entire absence of Cardiocerates from the strata of India, and their great abundance in the strata of North America. The wide distribution of Cardiocerates, for instance, over Britain, Russia and North America, seems to prove what is the corollary of the theory of dissimilar faunas: that if beds of the same date be found, the fossils are similar, and that it is the not being able to find beds of the right dates which accounts for the local absences.

A study of the extra-British beds of Oxford Oolites will show that certain faunas, conspicuous and widespread on the Continent, have found no place in the time-table of British strata. Such faunas are those of *Am. henrici*, *Am. canaliculatus*, *Am. transversarius* and *Am. bimammatus*, to name a few. The presence of coralliferous beds in the British area might be held accountable for some of these absences; but as these coralliferous beds are very local, even in the British Isles, not necessarily being common to two exposures only a few miles apart, that argument for the entire absence of these ammonitiferous faunas from the British Isles would be difficult to sustain. If difference of climate be pleaded to account for these absences, then similarity of climate at dates immediately before or after will have to be allowed to account for the presence of widespread species. Such chopping and changing of climate or of any other cause will be much more difficult to work than a theory of elevation and erosion on a globe whose crust is well known to be, and to have been, very unstable.

Lastly, is not a great error commonly made in supposing that a hemera is a short space of time? Relatively to geological time it is short—so short as to be the unit of its chronology; but in comparison with human years it is a long time. What is there to prevent giving to a hemera a length of time like a million years? The facts of faunal dispersal and of faunal evolution within the length of time called a hemera plead very strongly for some such extent. And in relation to geological history a million years could be no more than is a day in relation to human history.

So the beds of the Oxford Oolites and associated strata represented in Table VI would have taken, on this basis, some forty million years to deposit.

A sequence of Ages with the stratigraphical interpretation of the chronological terms was given in Vol. IV, pp. 6–13, 1922, but, though many hemeral terms have been used in text and plates, only partial sequences of them have been presented. It is now proposed to remedy this defect by giving a provisional list of hemeral terms in their order, from the latest to the earliest.

The first column gives the Age, the second column the hemeral terms of that Age in order, and the third column certain synonyms, especially the hemeral (or zonal) terms which may have been used before so much division had been made, for instance, in the earlier volumes of Type Ammonites.

It is not claimed that the present hemeral list is exhaustive. Since the multizonal or polyhemeral system was started in my papers of 1889 and 1893, as a result of extensive and intensive field-work in

S.W. England, and was still furter elaborated in subsequent papers, particularly of the present century, when the idea of the significance of dissimilar faunas was pointed out, there has been rapid and progressive increase in zonal (hemeral) terms—not necessarily a further division of already known deposits, but often really a recognition and naming of new stratal elements.

Dr. H. Salfeld, Mr. J. W. Tutcher, Dr. W. D. Lang, Dr. L. F. Spath, Dr. A. E. Trueman, Dr. Werner Lange, Mr. B. Thompson, are some of those who have carried on this stratigraphical-chronological work, and whose papers have been used for the hemeral sequences. Their labours show that as soon as intensive field-work is undertaken, the need for increase of divisional names (zonal or hemeral) becomes imperative.

The hemeral names marked with a star in the second column indicate those dates for which a species has been figured in the Volumes 1—5 of Type Ammonites, but do not imply that the actual name-species has been illustrated.

TABLE VIII—HEMERAL SEQUENCE

Ages	*Hemeræ*	*Synonyms*
Gigantitan	*glottodes	
	*hippocephaliticus	
	*Briareites	Titanites
	*Titanites	
	*Gigantites	
	*Trophonites	
	*fasciger	
Behemothan	*vau	
	*leptolobatus	
	*kerberus	
	*leucus	
	*glaucolithus	
	*megasthenes	
	*aquator	
Paravirgatitan	*lyditicus	rotundum
	*paravirgatus devillei	
	*pectinatus	
	*pringlei	Wheatleyites
	*wheatleyites boidini ?	cf. pectinatus
Pseudovirgatitan	*pallasioides	pallasianus
	*bivius	scruposus
Physodoceratan	*eudoxus	pseudomutabilis
Rasenian	*akanthophorus	Amoeboceras (spinous)
	*uralensis	
	*baylei	
Prionodoceratan	*superstes	
	*prionodes	serratum
	*dichotomum	martelli
Ringsteadian	*pseudocordatus	Ringsteadia

The sequence given by Messrs. Chatwin, Pringle and others in regard to the strata of the Behemothan to Pseudovirgatitan Ages cannot be applied to the Oxfordshire-Buckinghamshire deposits. The correlation put forward by Dr. Neaverson (Zones of the Kimmeridgian ; Geol. Mag.

LXI, 1924, 145—151) is certainly quite unworkable—too much reliance has been placed on fragmentary Ammonites from separated beds, which, even if obtained whole, would be, from their similarity, quite hard to distinguish, and there is too much speculation as to concealed deposits.
The fuller hemeral sequence of the Ages Pseudovirgatitan to Ringsteadian will be found in Vol. IV, 1923, Table III, pp. 33-35.

TABLE VIII—(continued)

Ages	*Hemeræ*	*Synonyms*
Perisphinctean	*cawtonense	
	*ingens	Dichotomoceras
	*pickeringius	
	*antecedens	
	*martelli	
Cardioceratan	*chalcedonicus	Vertebriceras
	*Vertebriceras	
	*Goliathiceras	vertebrale
	*Kranaosphinctes	Goliathiceras
	*excavatum	
	*cordatiforme	
	*Sagitticeras	
	*acuticostatum	
	*Korythoceras	
	*mite	
	*vernoni	oculatum
	*oculatum	

The fuller hemeral sequence of the Perisphinctean-Cardioceratan Ages will be found in Vol. V, pp. 67, 68.

Vertumniceratan	*gregarium	
	*silphouense	
	*sutherlandiæ	
	*ordinarium	
	*vertumnus	
	*Pachyceras	
	*renggeri	
	*navicula	renggeri (navicula)
Kosmoceratan	*lamberti	
	*duncani	
	*proniæ	
	*athleta	
	*svevum	
	*hoplistes	
	*zugium	
	*acutistriatum	
	*pollux	
	reginaldi	
	castor	
	*stutchburii	
	*conlaxatum	
Reineckeian	*rehmanni	
	anceps	
	coronatus	
	hecticus	
	fraasi	

TABLE VIII—(continued)

Ages	*Hemeræ*	*Synonyms*
Proplanulitan	*fracidus	
	*Crassiplanulites	
	*opimus	
	*Galilæiceras	
	*crioconus	
	*Catacephalites	
	*gulielmi	
	*rudis	
	*basileus	
	*Phlycticeras	koenigi
	*majesticus	

Specimens collected from Kellaways Rock and subjacent beds of Wiltshire by the Geological Survey show that *Gulielmiceras gulielmi*-like forms are from the base of the Kellaways Rock, and not from the upper part as was supposed (Pl. CXCIV); also that something resembling the *Catacephalites* faunas of South Cave, Yorkshire, occur in a similar position, and therefore do not indicate Macrocephalitan date.

Study of the faunas of Christian Malford and Calvert show that, possibly, many species assigned to the date of *athleta*, coming from the Kelloway Rock of Yorkshire, are earlier, possibly as early as *hoplistes* and *zugium* of Kosmoceratan. The Kelloway Rock of Yorkshire is a stratum much condensed, with many lacunæ, and it took from Ages Proplanulitan to Vertumniceratan to deposit it.

Macrocephalitan	*Kepplerites	
	*Macrocephalites	
	*Pleurocephalites	
	*dolius	
	*kamptus	
	*Cerericeras	
	*Homœoplanulites	
Clydoniceratan	*discus	

Thick non-ammonitiferous deposits of Forest Marble and Bradford Clay were deposited during the time-interval between *hollandi* and *discus*.

*hollandi

A considerable series of Great Oolite beds belong to the time-interval between *aspidoides* and *hollandi*.

Oxyceritan	*aspidoides	
	*waterhousei	
	*suspensus	
Tulitan	*Tulites	morrisi
	*Morrisiceras	morrisi
	*Bullatimorphites	
	*Morrisites	
	*Tulophorites	
	*Madarites	
	*Rugiferites	
	*Pleurophorites	
	*Sphæromorphites	

The sequence of hemeræ in the Tulitan given above is based on a recent study of the section of Thornford Beds in the quarry near Thornford, Dorset, and a comparison of the matrices of the different beds with those of the type specimens. The detailed section it is hoped to give in Vol. VI.

TABLE VIII—(continued)

Ages	*Hemeræ*	*Synonyms*
Gracilisphinctean	*micromphalus	
	*gracilis	
Zigzagiceratan	*recinctus	
	*fullonicus	
	*knapheuticus	
	*vermicularis	
	*imitator	
	*pollubrum	
	*zigzag	
Parkinsonian	*schloenbachi	truellei
	*truellei	
	*garantiana	
	*Vermisphinctes	garantiana, truellei
Stepheoceratan	*niortensis	
	*Leptosphinctes banksi	
	*pygmaeus	blagdeni
	*Epalxites	Stemmatoceras
	*parcicarinatum	
	*Masckeites	
Sonninian	*alsatica	
	*propinquans	sauzei
	*sauzei	
	*Labyrinthoceras	sauzei
	*Witchellia	
	*mollis	Witchellia (mollis)
	*hebes	mollis (hebes)
	*Shirbuirnia	
	*fissilobatum	Shirbuirnia
	ovalis	
	Bradfordia	
	*Docidoceras	discites (Eudmetoceras)
	*Trilobiticeras	Eudmetoceras (discites)
	Depaoceras	
	Reynesella	
	Platygraphoceras	

The evidence of the strata on the Ardnamurchan Coast, Argyllshire, Scotland, favours this sequence up to *Docidoceras*.

	rudidiscites	discites
	*eudmetum	discites (Eudmetoceras)
	*stigmosum	
Ludwigian	crassispinata	
	concava	} concava zone
	cornu	} concava zone
	Lucya	} concava zone
	casta	
	*platychora	

TABLE VIII—(continued)

Ages	*Hemeræ*	*Synonyms*
Ludwigian (contd.)	*Ambersites	bradfordensis (Ambersites)
	*Abbasites	bradfordensis (Abbasites)
	*planiforme	Erycites
		——
	*murchisonæ	[(Hoffman's sequence)
		murchisonæ
		staufensis
	*Erycites	
		discoideus
	Ancolioceras	
		sehndensis
	scissum	tolutarius
		sinon
		costosus
	opaliniforme	opalinus (large forms)
Canavarinan	Canavarella	opalinus (small forms)
		beyrichi]
		——
	venustula	
	digna	
	Cotteswoldia	

In the third column of the Ludwigian-Canavarinan sequence is placed the stratal sequence given by Dr. G. Hoffman (Stratigr. u. Amm.-Fauna d. Unt. Doggers in Sehnde bei Hannover; Stuttgart, 1913, pp. 7–28). The 'subzonal' names are put, so far as possible, opposite the appropriate faunal dates of the second column, but there are obviously some faunas which do not fit there.

Dr. Hoffman has united large series of forms under single names without any critical examination. Of the numerous forms which he unites as *Ludwigia concava* from his *concava* subzone only about one or two have any likeness at all to Sowerby's species. The main of the others are similar to series of forms which are found in Normandy, but do not occur in England. In part they might be of *Lucya* date, but are possibly earlier and distinct in date.

Dumortierian	*moorei	
	*Catulloceras	
	subsolaris	
	novata	
	levesquei	
	*Hammatoceras	
Grammoceratan	*dispansum	
	*struckmanni	
	pedicum	
	*eseri	
	thouarsense	
	*striatulum	
Haugian	pauper	
	*grandis	variabilis
	*malagma	lilli, variabilis
	lilli	

TABLE VIII—(continued)

Ages	*Hemeræ*	*Synonyms*
Hildoceratan	semipolitum	
	subplanatum	
	*braunianum	
	fibulatum	
	*bifrons	falciferum
	*subcarinata	
	*pseudovatum	
	Harpocerate (small)	
	*Hildoceratoides	falciferum
	*crassoides	lilli, fibulatum, subcarinatum, bifrons, exaratum
Harpoceratan	*falciferum	
	*Hildaites	falciferum
	anguinum	
	*Harpoceratoides	exaratum
	*murleyi	
	*exaratum	
	Grantham Amm.	
	*Eleganticeras	exaratum
	*Elegantuliceras	exaratum
	*tenuicostatum	
	*Tiltoniceras	
	*athleticum	acutum
	helianthoides ?	
	*paltus	

For most kind assistance in regard to the sequence in the Ages Ludwigian to Harpoceratan I am indebted to the late Mr. N. Laux, of Kayl, Luxemburg. He took up the ideas of faunal analysis and dissimilar faunas with great enthusiasm, applied them to the faunas of his own country, with which much field-work had made him familiar, sent over notes of the results, together with analyses of similar faunas in neighbouring countries, and submitted specimens to be checked, so that we might be talking of the same things. It has not yet been possible to do full justice to the notes, diagrams and analyses which he forwarded. It is hoped there may be opportunity for this later.

Amaltheian	*hawskerense	
	*regulare	acutum/spinatum
	*spinatum	
	*argutus	
	gibbosa	
	*margaritatus	
	*lenticularis	spinatum, laevis
	*laevis	
	*Seguenziceras	algovianum
	*clevelandicus	margaritatus, algovianum
	acanthoides	
	boscense	
	fieldingi	

TABLE VIII—(continued)

Ages	*Hemeræ*	*Synonyms*
Liparoceratan	*Oistoceras	striatum
	*dædalicosta	
	davoei	
	latæcosta	
	*Beaniceras	striatum, centaurus, capricornum/striatum
	*cheltiense	striatum
Polymorphitan	actaeon	valdani, ibex, capricornum
	maugenesti	
	masseanus	
	*pettos	
	*jamesoni	
	*obsoleta	jamesoni
	brevispina	
	*polymorphus	valdani
	caprarius	
	*phyllinus	oxynotum
	peregrinus	
	*Phricodoceras	armatum/jamesoni
Deroceratan	*leckenbyi	armatum
	*defluxum	lorioli
	*aplanatum	
	*macdonnellii	
	*raricostatoides	
	*boreale	oxynotum/raricostatum
	*tubellum	
	rhodanicum	
	costidomus	
	*miles	armatum
	*armatum	
	*anguiforme	armatum
	bispinigerum	
	*subplanicosta	
	*densinodulum	densinodum
Oxynoticeran	lymense	
	armatoid	
	*glevense	
	rothpletzi	
	*Radstockiceras	
	*polyophyllum	oxynotum
	*oxynotum	
	*biferum	oxynotum
	*simpsoni	oxynotum
	*Gagaticeras	oxynotum
	lacunata	
	*subpolita	stellare/oxynotum
Asteroceratan	*denotatus	stellaris
	stellaris	
	*planicosta	obtusum
	sagittarium	
	*obtusum	
	turgescens	
	*turneri	

TABLE VIII—(continued)

Ages	*Hemeræ*	*Synonyms*
Microderoceratan	inflatum	
	plotti	
	birchi	
	*hartmanni	semicostatum
	brooki	
	sulcifer	
	nodulosum	
	alcinoe	
Agassiceratan	*sauzeanum	gmuendense
	striaries	
	pseudokridion	
	*colesi	scipionianum
	*acuticarinatum	semicostatum
Coroniceratan	gmuendense	
	*meridionalis	
	charmassei	
	*bucklandi	
	kridion	
	*rotator	
Vermiceratan	scylla	schloenbachi (in use)
	brevidorsale	
	longidomus	
Schlotheimian	*acuticosta	
	*marmorea	angulata
	phoenix	liassicus
	gallica	liassicus
	prometheus	liassicus
	*laqueus	megastoma
	hagenowi	
Psiloceratan	portlocki	
	*johnstoni	
	plicatus	
	psilonotus	
	*erugatum	planorbis
	*aequabile	
	planorbis	

The strata and the faunal distribution of the Ammonites of the Psiloceratan in Somerset, Watchett and Radstock, Yorkshire, Scotland and Wurtemburg support some such sequence as that here given.

According to this Table (VIII) and those to which reference has been made, the strata from Psiloceratan to Gigantitan Ages represent a length of time of about 400 hemeræ.

The task for the succeeding volumes of Type Ammonites will be to give in detail the evidence, zoological, geographical and stratigraphical, for the hemeral sequences, in the same manner as it has been given in Vols. IV, V, for Gigantitan to Cardioceratan.

Publication Details

Parts	*Pages*	*Plates*	*Dates*
XLII (20 plates)		CDXXIII—CDXXVIIIA, B CDXXIX—CDXXXIIA, B CDXXXIII—CDXXXVIIIA, B CDXXXIX	8, X, 1923
XLIII (20 plates)		CDXL—CDLA, B CDLI—CDLIIA, B CDLIII—CDLVII	20, XII, 1923
XLIV (20 plates) 1 reprint)		CDLVIII—CDLXIXA, B CDLXX—CDLXXVI Reprint of CDLIII	29, II, 1924
XLV (16 plates, 2 reprints)	5–20	CDLXXVIIA, B—CDLXXXVIA, B CDLXXXVII—CDXC Reprints of CDLXIII, CDLXXI	9, V, 1924
XLVI (16 plates)	21–28	LXIVA, CXXVIA, CXCIXC, CDXCI—CDXCVA, B, CDXCVIA, B—DI	4, VII, 1924
XLVII (16 plates)		XCIXC, CCCXCVI [A], DII—DXIA, B, DXII—DXIV	29, VIII, 1924
XLVIII (11 plates, 1 reprint)	29–44	DXV—DXVIIA, B, DXVIII—DXXIV Reprint (revise) CDXL	27, X, 1924
XLIX (16 plates)	41–44 (reprinted) 45–48	CCCXLIIC, DXXVA, B DXXVI—DXXXA, B, DXXXI—DXXXIVA, B, DXXXV, DXXXVI	23, XII, 1924
L (20 plates)	49–56	CLIVA, DXXXVII, DXXXVIIIA, B, DXXXIX—DXLIIA, B, DXLIIIA, B, DXLIV, DXLVA, B, DXLVIA, B, DXLVII—DL	27, II, 1925
LI (20 plates, 1 reprint)	57–64	CLXXIXA, CCLIXC, CDXLA, DXIIIA, DXXXIA, DLI—DLVIIA, B, DLVIII—DLXA, B, DLXIA, B, DLXII. Reprint DXLIIIB	1, V, 1925
LII (19 plates, 1 revise)	65–78	CCCVIIC, CDLXXXVIC, DXIC, DLXIII, DLXIVA, B, DLXV—DLXXA, B, DLXXI—DLXXVI Revise of DXXIV	29, VI, 1925
LIIA	1—4, 79—90		31, VIII, 1925

Order of Binding

Pages 1—78, with text-figs. 1—8;
Plates LXVIA, XCIXC, CXXVIA, CLIVA, CLXXIXA, CCLIXC, CCCVII, C, CCCXLIIC, CCCXCVI[A], CDXXIII—DLXXVI;
Pages 79—90

ADDENDA, CORRIGENDA
(See also p. 24)

Page 6, line 11, for 'catagensis' read 'catagenesis'
,, 7, l. 26, for 'these' read 'there'
,, 8, l. 4, for 'rivals' read 'a rival'
,, 9, l. 21, for 'platyrthines' read 'platyrrhines'
,, 11, heading, for 'Zoological Arrangement' read 'Criticisms'
l. 2, for 'principle of' read 'principle to'
,, 21, l. 6 up for 'CDXLVII' read 'CDXLVI'
,, 28, l. 11, for '*diliuviana*' read '*diluviana*'
,, 32, ll. 8, 12 up, for '*hippocephalites*' read '*hippocephaliticus*'
,, 33, l. 25, for 'fig. 1a' read 'fig. 3a'
,, 37, l. 16, for 'W. 1' read 'W. 4'
l. 10 up, for 'G.G.' read 'GG.'
,, 38, l. 21, for 'V.V. 11' read 'VV. 18'
,, 44, l. 8 up, for '*peramatus*' read '*perarmatus*'
,, 47, l. 8, for 'p. 46' read 'p. 45'
,, 48, l. 24 and 49, l. 14, for '*rouillieri*' read '*rouilleri*'
,, 50, l. 24, for 'Perisphincteds' read 'Perisphinctids'
,, 54, l. 19, for '*rouillieri*' read '*rouilleri*'
,, 55, l. 14, for 'development to' read 'development of'
l. 20, for 'fail in not' read 'fail, not'
l. 4 up, after 'bands' add 'in Red Down Boring'
l. 3 up, delete 'in boring'
,, 63, l. 30, for 'Perisphinctiod' read 'Perisphinctoid'
,, 66, ll. 4, 5, up, delete entry of 'Purton, Wilts, light clay (A.M.D.)'
,, 68, ll. 23, 24: transpose these lines to read 'oculatum' above 'dieneri'
,, 69, ll. 8, 9 up: transpose these lines, placing 'dieneri, Moravia' below the oculatum line
l. 7 up, for 'hoplophorum' read 'hoplophorus'
,, 71, l. 16 up, for 'wheatleyites' read 'Wheatleyites'
,, 72, ll. 16, 17 up, insert '*subtense' between 'duncani' and 'proniæ'
,, 74, l. 19, under Hemeræ place '*garantiana' below *Vermisphinctes and its synonyms
l. 28, for 'alsatica' read 'alsaticus'
l. 10 up, put a * to 'rudidiscites'
,, 75, ll. 6, 7 under Hemeræ, place '*murchisonæ' opposite 'murchisonæ' of synonyms

Plate XCIXc, l. 2, for 'VI, 1' read 'VI, 2'
,, CDLXXXVIA, l. 2, for 'III, 2' read 'III, 4'
,, CDLXXXVIA, l. 3, after 'Bristol Museum' add 'C. 1798'
,, CDXCIX, l. 6, for 'Holotype' read 'Plesiotype'
,, DIII, l. 2, for 'Gammelshaüsen' read 'Gammelshausen'
,, DXIA, l. 4, for '29341' read '2934,'
,, DXVIII, ll. 5, 6, for 'meridionale' read 'meridionalis'
,, DXXVIII, l. 6, for '*alsatica*' read '*alsaticus*'
,, DXXXB, l. 3, add 'Whitby Museum, No. 165'
,, DXXXI, l. 4, for 'c. 1799[a]' read 'C. 1799'
,, DXXXI, l. 7, for '*stutchburn*' read '*stutchburii*'
,, DXXXII, l. 4, for 'C. 1799 [b]' read 'C. 1800'
,, DLXXII, l. 7, for 'Asteroceratan;' read 'Asteroceratan,'

INDEX