

Occurrence.—Plesiotype (Comm. Pal. Coll. No. 272): Cattle Creek below Waterfall, 14 miles S.E. from Springsure, Queensland (Lower Bowen Series).

Other Localities.—*Queensland*. Middle Bowen Series: Dry Creek, "Inglelara" property, Springsure; Gully on Argus's Selection, Springsure; Arcadia Bore, 2,070-2,075 feet. Lower Bowen Series: Staircase Gully below old Rolleston road cutting: 3 miles from Cracow on road to Theodore.

New South Wales. Upper and Lower Marine Series: localities in the Hunter River District listed by Crespin and Parr (1940). Upper Marine Series: Kulnura Bore at 4,020 feet.

Genus CALCITORNELLA Cushman and Waters, 1928.

CALCITORNELLA STEPHENSI (Howchin) (Pl. III, Fig. 3.).

Cornuspira sp. Jones, 1882, p. 6.

Nubecularia lucifuga Defrance var. *stephensi* Howchin, 1894, p. 345, Pl. xa, xia.

Nubecularia stephensi Chapman and Howchin, 1905, p. 5, pl. i, figs. 1, 2; Etheridge Junr., 1907, p. 13, pl. xii, fig. 11.

Calcitornella stephensi Chapman, Howchin and Parr, 1934, p. 187; Parr 1940, p. 108.

Observations.—*C. stephensi* was originally described by Howchin from a limestone at Piper River, Tasmania, where it is recorded as being "extremely abundant." It is also a common form in the Permian rocks in Western Australia. Etheridge Junr. records the species from a bore at Port Keats, Northern Territory, at the depth of 555-574 feet, where it is associated with abundant bryozoa and brachiopoda fragments. The specimen figured in this paper illustrates the surface that has been attached to the rock matrix. Greatest diameter, 1.12 mm.

Occurrence.—Plesiotype (Comm. Pal. Coll. No. 273): Pokolbin, Hunter River district, New South Wales (Lower Marine Series). *Other Localities*.—*Queensland*. Lower Bowen Series: Mt. Hope, 20 miles S. of Springsure; N. bank of Cattle Creek, 14 miles S.E. of Springsure, in shelly mudstone; in Cattle Creek below Waterfall, near Springsure.

New South Wales. Lower Marine Series: Hunter River District.—Cranky Corner; Road Cutting, Jackson's Hill.

Tasmania. Lower Marine Series: Piper River, N.W. of Karoola.

Genus AMMOBACULITES Cushman, 1910.

AMMOBACULITES WOOLNOUGHII Crespin and Parr (Pl. III., Fig. 4).

Ammobaculites woolnoughi Crespin and Parr, 1940, p. 304, pl. xii, figs 2a, b; 3 a, b. Parr, 1940-1941, p. 108, pl. i., fig. 11.

SOME PERMIAN FORAMINIFERA FROM EASTERN AUSTRALIA.

By IRENE CRESPIN, B.A., Commonwealth Palaeontologist,
Mineral Resources Survey Branch, Canberra.

(WITH PLATE III.)

Communicated by O. Jones, M.Sc.

(Received 24th April, 1944; read before the Royal Society of Queensland,
31st July, 1944; issued separately, 5th February, 1945.)

INTRODUCTION.

Recent investigations of the Permian rocks of Queensland and New South Wales have shown that microfossils are well distributed in them. Permian foraminifera have been described by Howchin (1893, 1895), Chapman and Howchin (1905), Etheridge Junr. (1906), Parr (1940) and Crespin and Parr (1940), from deposits in New South Wales, Tasmania, Western Australia and Northern Territory, but none has been previously listed from Queensland.

Four new species are described in the present paper and notes are given on previously described forms. The Queensland material examined includes rocks collected by Dr. K. Washington Gray during his investigations in the Springsure area for Commonwealth Oil Refineries Ltd., from rocks collected from the same area by geologists of Oil Search Limited, and from cores and cuttings from the Arcadia Bore, 84 miles north of Roma. The New South Wales specimens are mainly from rock collections made by Dr. Washington Gray and geologists of Oil Search Limited, in the Hunter River District, and drill cuttings from the Kulnura Bore, parish Kooree, county Northumberland (Raggatt and Crespin, 1940).

In Queensland, the foraminifera occur in beds belonging to the Middle Bowen and Lower Bowen Series, and in New South Wales to the Upper Marine and Lower Marine Series.

The state of preservation of the tests varies, many of them being crushed and distorted. Some are brownish in colour, while those from the carbonaceous shales in the Kulnura Bore are almost black.

The new species of foraminifera herein described are:—*Nodosaria serocoldensis*, *Nodosaria springsurensis*, *Dentalina grayi*, and *Frondicularia parri*.

All specimens are in the Commonwealth Palaeontological Collection at Canberra. The plate accompanying this paper has been prepared by Mr. F. Canavan, M.Sc., of the Mineral Resources Survey, Canberra.

DESCRIPTION OF SPECIES.

Genus HYPERAMMINOIDES Cushman and Waters, 1928.

HYPERAMMINOIDES ACICULA Parr, (Pl. III., Fig. 1.)

Hyperamminoides sp. cf. *proteus* (Cushman and Waters), Crespin and Parr, 1940, p. 301, pl. xii, figs. 4a, b; 5a-c.

Hyperamminoides acicula Parr, 1940, p. 105, pl. i, figs. 4, 5; pl. ii, fig. 4.

Observations.—*H. acicula* is the commonest foraminiferal species in the Permian rocks of Australia, but few complete tests are available. The figured specimen from the Springsure district, Queensland, is incomplete. It is a slender form and resembles that figured by Parr (pl. 1, fig. 5, 1940) from the *Lingula* beds, Wandagee Station, Western Australia. The majority of specimens from Eastern Australia are stouter and usually more flattened than the type. Length of plesiotype, 1.21 mm.; greatest width, 0.22 mm.

Occurrence.—Plesiotype (Comm. Pal. Coll. No. 271): Dry Creek, "Inglelara" property, Springsure, Queensland (Middle Bowen Series). Other Localities.—*Queensland.* Middle Bowen Series: lower part of exposure, Argus's Selection, Springsure; Arcadia Bore, at 2,070-2,075 feet. Lower Bowen Series: Aldbaran Creek, 4 miles N.E. of Mt. Catherine, 30 miles W. of Rolleston; Watershed between Little Gorge and Cabbage Tree Creeks near Springsure; 3 miles from Cracow on road to Theodore.

New South Wales. Upper and Lower Marine Series: localities in the Hunter River District listed by Crespin and Parr (1940). Upper Marine Series: Balmain Bore, City of Sydney, between 4,750 and 4,845 feet; Kulnura Bore at various depths between 3,865 feet and 4,465 feet; Bore J, Coorabin, 55 miles N.W. of Albury, at 384 feet.

Lower Marine Series: Kulnura Bore, between 4,790 feet and 6,019 feet.

Genus AMMODISCUS Reuss, 1816.

AMMODISCUS MULTICINCTUS Crespin and Parr (Pl. III, Fig. 2.).

Ammodiscus multicinctus (Crespin and Parr, 1940, p. 303, pl. xii, figs. 1a, b).

Observations.—This small species of *Ammodiscus* was described from beds belonging to the Lower Marine Series, in a railway cutting 4 chains west of Farley Station, Hunter River District, New South Wales. The species is well represented in other Permian deposits in that district and also in those around Springsure, Queensland. The figured specimen is from this latter area. Diameter of plesiotype: 0.52 mm.

Observations.—The figured specimen is identical with the type which was described from the beds along the Farley road, 300 yards N.E. of Farley Station, Hunter River District, New South Wales. Parr has also recorded the species from the Wandagee beds in Western Australia. The Queensland specimens are slightly crushed, but are definitely referable to *A. woolnoughi*. Length of plesiotype, 1.10 mm.; greatest width of coiled portion, 0.54 mm.

Occurrence.—Plesiotype (Comm. Pal. Coll. No. 274): McDougall's Hill, Singleton, Hunter River District, New South Wales (Upper Marine Series). Other Localities.—*Queensland*. Middle Bowen Series: Arcadia Bore, at 2,335-2,340 feet. Lower Bowen Series: Cattle Creek, below Waterfall, 14 miles S.E. of Springsure; Aldbaran Creek, 4 miles N.E. of Mt. Catherine, 30 miles W. of Rolleston.

New South Wales. Upper and Lower Marine Series: localities in the Hunter River District listed by Crespin and Parr (1940).

Genus NODOSARIA Lamarck, 1812.

NODOSARIA SPRINGSURENSIS sp. nov. (Pl. III., Fig. 5).

Holotype.—Test elongate, gently tapering, greatest width near apertural end, circular in transverse section. Chambers, six; sutures distinct, depressed. Test covered with about 16 raised longitudinal costae, which extend over the length of the shell. Aperture central, terminal, radiate. Length, 1.62 mm.; greatest width, 0.39 mm.

Observations.—*N. springsurensis* is described from a single well-preserved specimen. The ornamentation is much coarser than in *N. irwinensis* Howchin and slightly coarser than *N. striato-clavata* Spandel which has 20 costae.

Occurrence.—Holotype (Comm. Pal. Coll. No. 275): In Cattle Creek below Waterfall, 14 miles S.E. of Springsure, Queensland (Lower Bowen Series).

NODOSARIA SEROCOLDENSIS sp. nov. (Pl. III., Fig. 6).

Holotype.—Test elongate, smooth, tapering, greatest width in apertural chamber, circular in transverse section. Chambers six, apertural chamber large, others gradually decreasing in size. Sutures indistinct, straight. Aperture small, central, radiate, terminal. Test white. Length, 1.02 mm.; greatest width, 0.43 mm.

Paratype.—Test elongate, longer than holotype. Margins parallel for two-thirds of length then tapering sharply to aboral end. Chambers seven, decreasing in size from apertural end. Sutures indistinct, straight. Aperture central, radiate, terminal. Test brown. Length, 1.21 mm.; greatest width, 0.42 mm.

Observations.—*N. serocoldensis* resembles the Tertiary and Recent species *N. radícula* Linné, in general shape, but differs in the more acute

tapering towards the aboral end and the less impressed sutures. Several specimens of the species are present in the Kulnura Bore, but they are smaller than the Queensland ones.

Occurrence.—Holotype (Comm. Pal. Coll. No. 276) and Paratype (Comm. Pal. Coll. No. 277): Cattle Creek below Waterfall, 14 miles S.E. of Springsure, Queensland (Lower Bowen Series).

Other Localities.—*New South Wales*. Upper Marine Series: Kulnura Bore, at 3,846 feet and 3,884 feet.

Genus DENTALINA D'Orbigny, 1826.

DENTALINA GRAYI sp. nov., (Pl. III., Fig. 8).

Holotype.—Test small, elongate, slender, gently curved and tapering, with greatest width in apertural chamber. Chambers seven, slightly inflated and gradually increasing in size towards apertural end. Sutures distinct, straight, depressed. Aperture terminal, radiate. Length, 0.75 mm.; greatest width, 0.17 mm.

Observations.—*Dentalina grayi* is described from a single well-preserved specimen. It differs from *D. bradyi* Spandel, recorded by Chapman and Howchin from a limestone at Wollong, New South Wales, in its more slender appearance. The species has been named after Dr. K. Washington Gray, who collected the material during his investigations in the Springsure area.

Occurrence.—Holotype (Comm. Pal. Coll. No. 278): Lower part of the exposure on Argus's Selection, Springsure, Queensland (Middle Bowen Series.).

Genus FRONDICULARIA Defrance, 1826.

FRONDICULARIA PARRI sp. nov., (Pl. III., Figs. 9, 10, 11).

Holotype.—Test elongate, compressed, with greatest width near apertural end; earlier portion tapering sharply, sides of later portion almost parallel. Aboral and subacute. Peripheral margin rounded. Chambers ten. Sutures distinct, marked by clear shell matter, acutely arched along medium line. Wall ornamented with distinct irregular, longitudinal raised costae, extending over whole of test. Aperture small, terminal. Length, 0.80 mm.; greatest width, 0.28 mm.

Paratypes.—(a) Test shorter than holotype and tapering more evenly. The costae are irregular and slightly coarser, with a tendency to divide. Chambers distinct. Sutures strongly arched along median line. Length, 0.64 mm.; greatest width, 0.30 mm.

(b) Test broad, widest near aperture, and tapering strongly to aboral end. Sutures arched but obscured by surface ornament. Chambers also obscured. Costae coarse with a tendency to anastomose from the median line. Length, 0.77 mm.; greatest width, 0.42 mm.

Occurrence.—Plesiotype (Comm. Pal. Coll. No. 272): Cattle Creek below Waterfall, 14 miles S.E. from Springsure, Queensland (Lower Bowen Series).

Other Localities.—*Queensland*. Middle Bowen Series: Dry Creek, "Inglelara" property, Springsure; Gully on Argus's Selection, Springsure; Arcadia Bore, 2,070-2,075 feet. Lower Bowen Series: Staircase Gully below old Rolleston road cutting: 3 miles from Cracow on road to Theodore.

New South Wales. Upper and Lower Marine Series: localities in the Hunter River District listed by Crespin and Parr (1940). Upper Marine Series: Kulnura Bore at 4,020 feet.

Genus CALCITORNELLA Cushman and Waters, 1928.

CALCITORNELLA STEPHENSI (Howchin) (Pl. III, Fig. 3.).

Cornuspira sp. Jones, 1882, p. 6.

Nubecularia lucifuga Defrance var. *stephensi* Howchin, 1894, p. 345, Pl. xa, xia.

Nubecularia stephensi Chapman and Howchin, 1905, p. 5, pl. i, figs. 1, 2; Etheridge Junr., 1907, p. 13, pl. xii, fig. 11.

Calcitornella stephensi Chapman, Howchin and Parr, 1934, p. 187; Parr 1940, p. 108.

Observations.—*C. stephensi* was originally described by Howchin from a limestone at Piper River, Tasmania, where it is recorded as being "extremely abundant." It is also a common form in the Permian rocks in Western Australia. Etheridge Junr. records the species from a bore at Port Keats, Northern Territory, at the depth of 555-574 feet, where it is associated with abundant bryozoa and brachiopoda fragments. The specimen figured in this paper illustrates the surface that has been attached to the rock matrix. Greatest diameter, 1.12 mm.

Occurrence.—Plesiotype (Comm. Pal. Coll. No. 273): Pokolbin, Hunter River district, New South Wales (Lower Marine Series). *Other Localities*.—*Queensland*. Lower Bowen Series: Mt. Hope, 20 miles S. of Springsure; N. bank of Cattle Creek, 14 miles S.E. of Springsure, in shelly mudstone; in Cattle Creek below Waterfall, near Springsure.

New South Wales. Lower Marine Series: Hunter River District.—Cranky Corner; Road Cutting, Jackson's Hill.

Tasmania. Lower Marine Series: Piper River, N.W. of Karoola.

Genus AMMOBACULITES Cushman, 1910.

AMMOBACULITES WOOLNOUGHII Crespin and Parr (Pl. III., Fig. 4).

Ammobaculites woolnoughi Crespin and Parr, 1940, p. 304, pl. xii, figs 2a, b; 3 a, b. Parr, 1940-1941, p. 108, pl. i., fig. 11.

Observations.—The figured specimen is identical with the type which was described from the beds along the Farley road, 300 yards N.E. of Farley Station, Hunter River District, New South Wales. Parr has also recorded the species from the Wandagee beds in Western Australia. The Queensland specimens are slightly crushed, but are definitely referable to *A. woolnoughi*. Length of plesiotype, 1.10 mm.; greatest width of coiled portion, 0.54 mm.

Occurrence.—Plesiotype (Comm. Pal. Coll. No. 274): McDougall's Hill, Singleton, Hunter River District, New South Wales (Upper Marine Series). Other Localities.—*Queensland*. Middle Bowen Series: Arcadia Bore, at 2,335-2,340 feet. Lower Bowen Series: Cattle Creek, below Waterfall, 14 miles S.E. of Springsure; Aldbaran Creek, 4 miles N.E. of Mt. Catherine, 30 miles W. of Rolleston.

New South Wales. Upper and Lower Marine Series: localities in the Hunter River District listed by Crespin and Parr (1940).

Genus NODOSARIA Lamarck, 1812.

NODOSARIA SPRINGSURENSIS sp. nov. (Pl. III., Fig. 5).

Holotype.—Test elongate, gently tapering, greatest width near apertural end, circular in transverse section. Chambers, six; sutures distinct, depressed. Test covered with about 16 raised longitudinal costae, which extend over the length of the shell. Aperture central, terminal, radiate. Length, 1.62 mm.; greatest width, 0.39 mm.

Observations.—*N. springsurensis* is described from a single well-preserved specimen. The ornamentation is much coarser than in *N. irwinensis* Howchin and slightly coarser than *N. striato-clavata* Spandel which has 20 costae.

Occurrence.—Holotype (Comm. Pal. Coll. No. 275): In Cattle Creek below Waterfall, 14 miles S.E. of Springsure, Queensland (Lower Bowen Series).

NODOSARIA SEROCOLDENSIS sp. nov. (Pl. III., Fig. 6).

Holotype.—Test elongate, smooth, tapering, greatest width in apertural chamber, circular in transverse section. Chambers six, apertural chamber large, others gradually decreasing in size. Sutures indistinct, straight. Aperture small, central, radiate, terminal. Test white. Length, 1.02 mm.; greatest width, 0.43 mm.

Paratype.—Test elongate, longer than holotype. Margins parallel for two-thirds of length then tapering sharply to aboral end. Chambers seven, decreasing in size from apertural end. Sutures indistinct, straight. Aperture central, radiate, terminal. Test brown. Length, 1.21 mm.; greatest width, 0.42 mm.

Observations.—*N. serocoldensis* resembles the Tertiary and Recent species *N. radícula* Linné, in general shape, but differs in the more acute

Observations.—*Fron dicularia parri* shows considerable variation in external form, a character which is also marked in *F. woodwardi* Howchin. This variation is illustrated in the figured specimens. The species resembles in costation a form described by Cushman and Waters (1928) as *Spandelina fissicostata*. In both species the costae are irregular and anastomosing, a feature especially noticeable in paratype (*b*). The costae in the holotype are finer than in *S. fissicostata* and the periphery is rounder. The same variation in shape is apparent in both species. *F. parri* is fairly common in the Kulmura Bore, but is rare in the Queensland deposits. The species is named after Mr. W. J. Parr of the Victorian Mines Department.

Occurrence.—Holotype (Comm. Pal. Coll. No. 279) and Paratypes (Comm. Pal. Coll. Nos. 280, 281): Kulnura Bore, parish Kooree, county Northumberland, New South Wales, at 4,203 feet (Upper Marine Series).

Other Localities.—*Queensland*. Lower Bowen Series: Watershed between Little Gorge and Cabbage Tree Creeks, near Springsure; North bank of Cattle Creek, 14 miles S.E. of Springsure.

New South Wales. Upper Marine Series: Kulnura Bore at 4,020, 4,123, 4,173 and 4,268 feet.

FRON DICULARIA WOODWARDI Howchin, (Pl. III., Figs. 12, 13).

Fron dicularia sp. Howchin 1894, p. 336.

Fron dicularia woodwardi Howchin 1895, p. 197, pl. x., figs. 4-6; Chapman and Howchin 1905, p. 16, pl. iii., fig. 2.

Observations.—Howchin described this species from the Irwin River, Western Australia. Numerous specimens are present in the Permian deposits of Queensland and New South Wales. The Queensland specimens are well developed. The figured ones are from the Springsure area, and illustrate the variability of the species. Lengths of plesiotypes: (*a*) 1.63 mm.; (*b*) 0.97 mm.

Occurrence.—Plesiotypes (Comm. Pal. Coll. Nos. 282, 283); (*a*) In Cattle Creek below Waterfall, 14 miles S.E. of Springsure, Queensland. (*b*) Mt. Hope, 20 miles S. of Springsure (Lower Bowen Series).

Other Localities.—*Queensland*. Lower Bowen Series: "Eurydesma" beds in "Ironbark" or Little Gorge Creek, near Springsure; Watershed between Little Gorge and Cabbage Tree Creeks, Springsure; 3 miles from Cracow on road to Theodore; 2.5 miles from Mantuan Downs, Springsure road.

New South Wales. Upper Marine Series: Kulnura Bore, at 3,840, 3,865, and 4,203 feet. Lower Marine Series: Hunter River District—Road Cutting, Jackson's Hill, Pokolbin.

Genus GEINITZINA Spandel, 1901.

GEINITZINA TRIANGULARIS Chapman and Howchin (Pl. III., Figs. 14, 15).

Geinitzina triangularis Chapman and Howchin, 1905, p. 16, pl. ii., figs. 9a, b; 10. Chapman, Howchin and Parr, 1934, p. 181, text figs. 1-5.

Observations.—The specimens of *G. triangularis* figured in this paper are from material from Pokolbin, the type locality for the species, collected by Dr. G. D. Osborne for Oil Search Ltd. They illustrate the megalospheric and microspheric forms of the species. The microspheric form is longer than the megalospheric and the chambers in the early stages are very small and numerous. In another microspheric specimen which is incomplete a terminal spine is present in the earliest portion. All tests are well polished. Length of topotypes: (a) 1.01 mm.; (b) 0.73 mm.

Occurrence.—Topotypes (Comm. Pal. Coll. Nos. 284, 285): (a) microspheric, (b) megalospheric—Pokolbin, Hunter River District, New South Wales (Lower Marine Series).

Other Localities.—*Queensland.* Lower Bowen Series: North bank of Cattle Creek, 14 miles S.E. of Springsure; Cattle Creek below Waterfall, near Springsure; Mt. Hope, 20 miles S. of Springsure; 2.5 miles from Mantuan Downs, on Springsure road; 3 miles from Cracow on road to Theodore.

REFERENCES.

- CHAPMAN, F., and HOWCHIN, W., 1905: A Monograph of the Foraminifera of the Permo-Carboniferous Limestones of New South Wales. *Mem. Geol. Surv. N.S. Wales* Pal. 14, pls. 1-4.
- , and PARR, W. J., 1934: A Revision of the Nomenclature of the Permian Foraminifera of New South Wales. *Proc. Roy. Soc. Vict.* 47, (1), N.S. pp. 175-189. Text figures.
- CRESPIN, I., 1943: Permian Foraminifera from a Bore at Coorabin, New South Wales. *Aust. Journ. Sci.* 6, (2), p. 65.
- , and PARR, W. J., 1940: Arenaceous Foraminifera from the Permian Rocks of New South Wales. *Journ. Proc. Roy. Soc. N.S. Wales* 74, pp. 300-311, pls. 12-13.
- CUSHMAN, J. A., and WATERS, J. A., 1928: Upper Paleozoic Foraminifera from Sutton County, Texas. *Journ. Pal.* 2, (4), pp. 358-371, pls. 47-49.
- HOWCHIN, W., 1894: On the Occurrence of Foraminifera in the Permo-carboniferous Rocks of Tasmania. *Australas. Ass. Adv. Sci. Adelaide Meeting* (1893), pp. 334-348, pls. 10, 11.
- , 1895: Carboniferous Foraminifera of Western Australia, with Description of New Species. *Trans. Roy. Soc. S. Aust.* 19, pl. 10.
- JONES, T. R., 1882: Catalogue of the Fossil Foraminifera in the Museum (Natural History), London.
- PARR, W. J., 1940: Foraminifera and a Tubiculous Worm from the Permian of the North-west Division of Western Australia. *Journ. Roy. Soc. W. Aust.* 27, pp. 97-111, pls. 1, 2.
- RAGGATT, H. G., and CRESPIN, I., 1940: Possibility of Heavy-Mineral Correlation of Some Permian Sedimentary Rocks, New South Wales, by Dorothy Carroll. Discussion. *Bull. Amer. Assoc. Petr. Geol.* 24, pp. 1682-1683.
- , 1941: Geological Notes on Natural Gas and Oil Corporation's Bore at Balmain, City of Sydney, New South Wales. *Aust. Journ. Sci.* 4, (3), pp. 102, 103.

tapering towards the aboral end and the less impressed sutures. Several specimens of the species are present in the Kulnura Bore, but they are smaller than the Queensland ones.

Occurrence.—Holotype (Comm. Pal. Coll. No. 276) and Paratype (Comm. Pal. Coll. No. 277): Cattle Creek below Waterfall, 14 miles S.E. of Springsure, Queensland (Lower Bowen Series).

Other Localities.—*New South Wales*. Upper Marine Series: Kulnura Bore, at 3,846 feet and 3,884 feet.

Genus DENTALINA D'Orbigny, 1826.

DENTALINA GRAYI sp. nov., (Pl. III., Fig. 8).

Holotype.—Test small, elongate, slender, gently curved and tapering, with greatest width in apertural chamber. Chambers seven, slightly inflated and gradually increasing in size towards apertural end. Sutures distinct, straight, depressed. Aperture terminal, radiate. Length, 0.75 mm.; greatest width, 0.17 mm.

Observations.—*Dentalina grayi* is described from a single well-preserved specimen. It differs from *D. bradyi* Spandel, recorded by Chapman and Howchin from a limestone at Wollong, New South Wales, in its more slender appearance. The species has been named after Dr. K. Washington Gray, who collected the material during his investigations in the Springsure area.

Occurrence.—Holotype (Comm. Pal. Coll. No. 278): Lower part of the exposure on Argus's Selection, Springsure, Queensland (Middle Bowen Series.).

Genus FRONDICULARIA Defrance, 1826.

FRONDICULARIA PARRI sp. nov., (Pl. III., Figs. 9, 10, 11).

Holotype.—Test elongate, compressed, with greatest width near apertural end; earlier portion tapering sharply, sides of later portion almost parallel. Aboral and subacute. Peripheral margin rounded. Chambers ten. Sutures distinct, marked by clear shell matter, acutely arched along medium line. Wall ornamented with distinct irregular, longitudinal raised costae, extending over whole of test. Aperture small, terminal. Length, 0.80 mm.; greatest width, 0.28 mm.

Paratypes.—(a) Test shorter than holotype and tapering more evenly. The costae are irregular and slightly coarser, with a tendency to divide. Chambers distinct. Sutures strongly arched along median line. Length, 0.64 mm.; greatest width, 0.30 mm.

(b) Test broad, widest near aperture, and tapering strongly to aboral end. Sutures arched but obscured by surface ornament. Chambers also obscured. Costae coarse with a tendency to anastomose from the median line. Length, 0.77 mm.; greatest width, 0.42 mm.

Observations.—*Fron dicularia parri* shows considerable variation in external form, a character which is also marked in *F. woodwardi* Howchin. This variation is illustrated in the figured specimens. The species resembles in costation a form described by Cushman and Waters (1928) as *Spandelina fissicostata*. In both species the costae are irregular and anastomosing, a feature especially noticeable in paratype (*b*). The costae in the holotype are finer than in *S. fissicostata* and the periphery is rounder. The same variation in shape is apparent in both species. *F. parri* is fairly common in the Kulmura Bore, but is rare in the Queensland deposits. The species is named after Mr. W. J. Parr of the Victorian Mines Department.

Occurrence.—Holotype (Comm. Pal. Coll. No. 279) and Paratypes (Comm. Pal. Coll. Nos. 280, 281): Kulnura Bore, parish Kooree, county Northumberland, New South Wales, at 4,203 feet (Upper Marine Series).

Other Localities.—*Queensland*. Lower Bowen Series: Watershed between Little Gorge and Cabbage Tree Creeks, near Springsure; North bank of Cattle Creek, 14 miles S.E. of Springsure.

New South Wales. Upper Marine Series: Kulnura Bore at 4,020, 4,123, 4,173 and 4,268 feet.

FRON DICULARIA WOODWARDI Howchin, (Pl. III., Figs. 12, 13).

Fron dicularia sp. Howchin 1894, p. 336.

Fron dicularia woodwardi Howchin 1895, p. 197, pl. x., figs. 4-6; Chapman and Howchin 1905, p. 16, pl. iii., fig. 2.

Observations.—Howchin described this species from the Irwin River, Western Australia. Numerous specimens are present in the Permian deposits of Queensland and New South Wales. The Queensland specimens are well developed. The figured ones are from the Springsure area, and illustrate the variability of the species. Lengths of plesiotypes: (*a*) 1.63 mm.; (*b*) 0.97 mm.

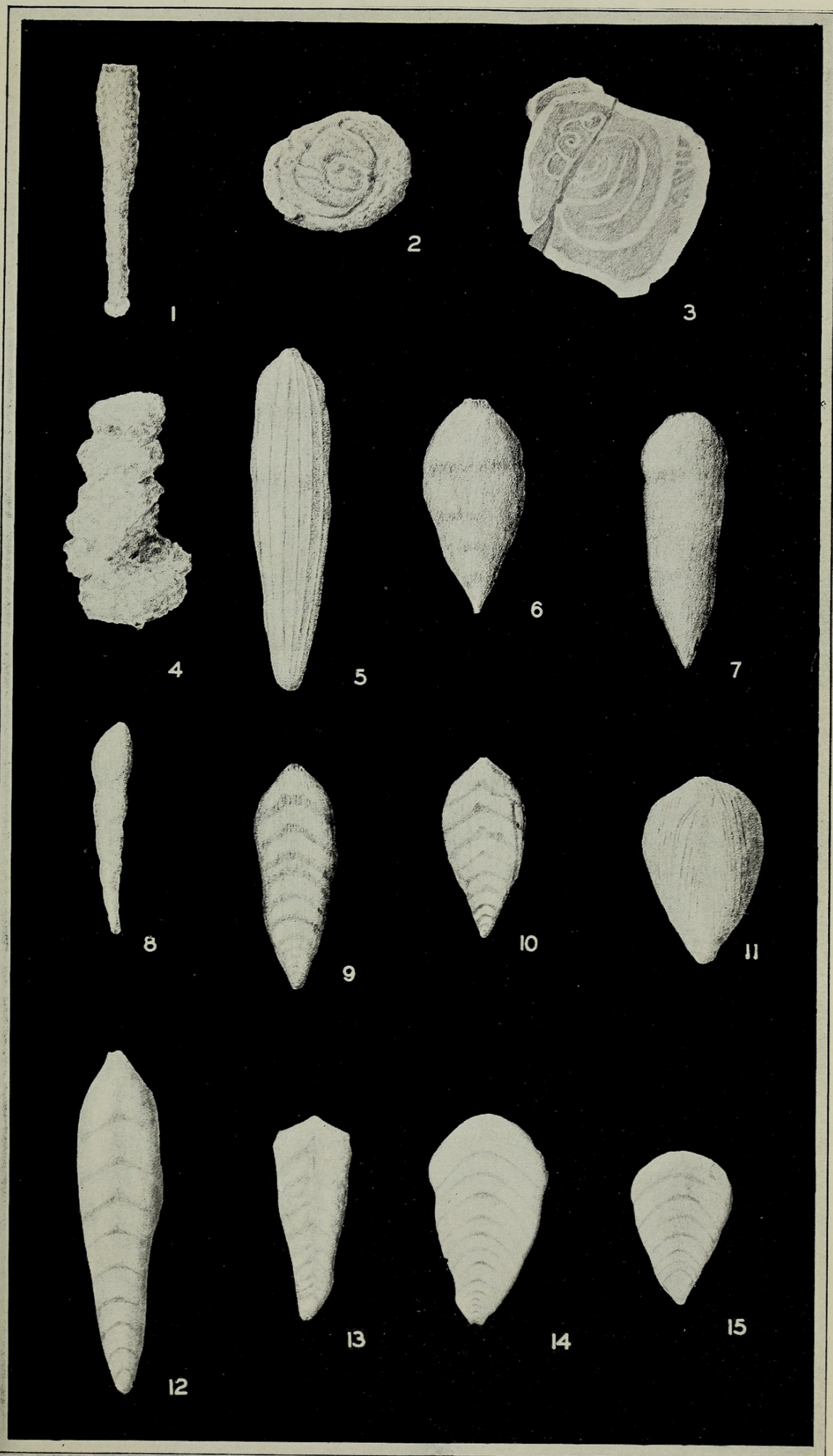
Occurrence.—Plesiotypes (Comm. Pal. Coll. Nos. 282, 283); (*a*) In Cattle Creek below Waterfall, 14 miles S.E. of Springsure, Queensland. (*b*) Mt. Hope, 20 miles S. of Springsure (Lower Bowen Series).

Other Localities.—*Queensland*. Lower Bowen Series: "Eurydesma" beds in "Ironbark" or Little Gorge Creek, near Springsure; Watershed between Little Gorge and Cabbage Tree Creeks, Springsure; 3 miles from Cracow on road to Theodore; 2.5 miles from Mantuan Downs, Springsure road.

New South Wales. Upper Marine Series: Kulnura Bore, at 3,840, 3,865, and 4,203 feet. Lower Marine Series: Hunter River District—Road Cutting, Jackson's Hill, Pokolbin.

EXPLANATION OF PLATE III.

- Fig. 1.—*Hyperamminoides acicula* Parr. Dry Creek, "Inglelara" property, Springsure, Queensland. Plesiotype, x 30.
- Fig. 2.—*Ammodiscus multicinctus* Crespin and Parr. Cattle Creek below Waterfall, near Springsure, Queensland. Plesiotype, x 40.
- Fig. 3.—*Calcitornella stephensi* (Howchin). Pokolbin, Hunter River District, New South Wales. Showing surface that has been attached to rock. Plesiotype, x 30.
- Fig. 4.—*Ammobaculites woolnoughi* Crespin and Parr. McDougall's Hill, Singleton, New South Wales. Plesiotype, x 30.
- Fig. 5.—*Nodosaria springsurensis* sp. nov. Cattle Creek below Waterfall, near Springsure, Queensland. Holotype, x 30.
- Fig. 6.—*Nodosaria serocoldensis* sp. nov. Cattle Creek below Waterfall, near Springsure, Queensland. Holotype, x 30.
- Fig. 7.—*N. serocoldensis* sp. nov. Locality same as holotype. Paratype, x 30.
- Fig. 8.—*Dentalina grayi* sp. nov. Lower part of exposure on Argus's Selection, Springsure, Queensland. Holotype, x 40.
- Fig. 9.—*Frondicularia parri* sp. nov. Kulnura Bore, New South Wales, at 4,203 feet. Holotype, x 40.
- Fig. 10.—*F. parri* sp. nov. Locality same as holotype. Paratype, x 40.
- Fig. 11.—*F. parri* sp. nov. Locality same as holotype. Paratype. Showing irregular character of striae, x 40.
- Fig. 12.—*F. woodwardi* Howchin. Cattle Creek below Waterfall, near Springsure, Queensland. Plesiotype, x 30.
- Fig. 13.—*F. woodwardi* Howchin. Mt. Hope, 20 miles S. of Springsure, Queensland. Plesiotype, x 30.
- Fig. 14.—*Geinitzina triangularis* Chapman and Howchin. Pokolbin, New South Wales. Microspheric form. Topotype, x 30.
- Fig. 15.—*G. triangularis* Chapman and Howchin. Pokolbin. Megalospheric form. Topotype, x 30.
-



PERMIAN FORAMINIFERA FROM EASTERN AUSTRALIA.

Genus GEINITZINA Spandel, 1901.

GEINITZINA TRIANGULARIS Chapman and Howchin (Pl. III., Figs. 14, 15).

Geinitzina triangularis Chapman and Howchin, 1905, p. 16, pl. ii., figs. 9a, b; 10. Chapman, Howchin and Parr, 1934, p. 181, text figs. 1-5.

Observations.—The specimens of *G. triangularis* figured in this paper are from material from Pokolbin, the type locality for the species, collected by Dr. G. D. Osborne for Oil Search Ltd. They illustrate the megalospheric and microspheric forms of the species. The microspheric form is longer than the megalospheric and the chambers in the early stages are very small and numerous. In another microspheric specimen which is incomplete a terminal spine is present in the earliest portion. All tests are well polished. Length of topotypes: (a) 1.01 mm.; (b) 0.73 mm.

Occurrence.—Topotypes (Comm. Pal. Coll. Nos. 284, 285): (a) microspheric, (b) megalospheric—Pokolbin, Hunter River District, New South Wales (Lower Marine Series).

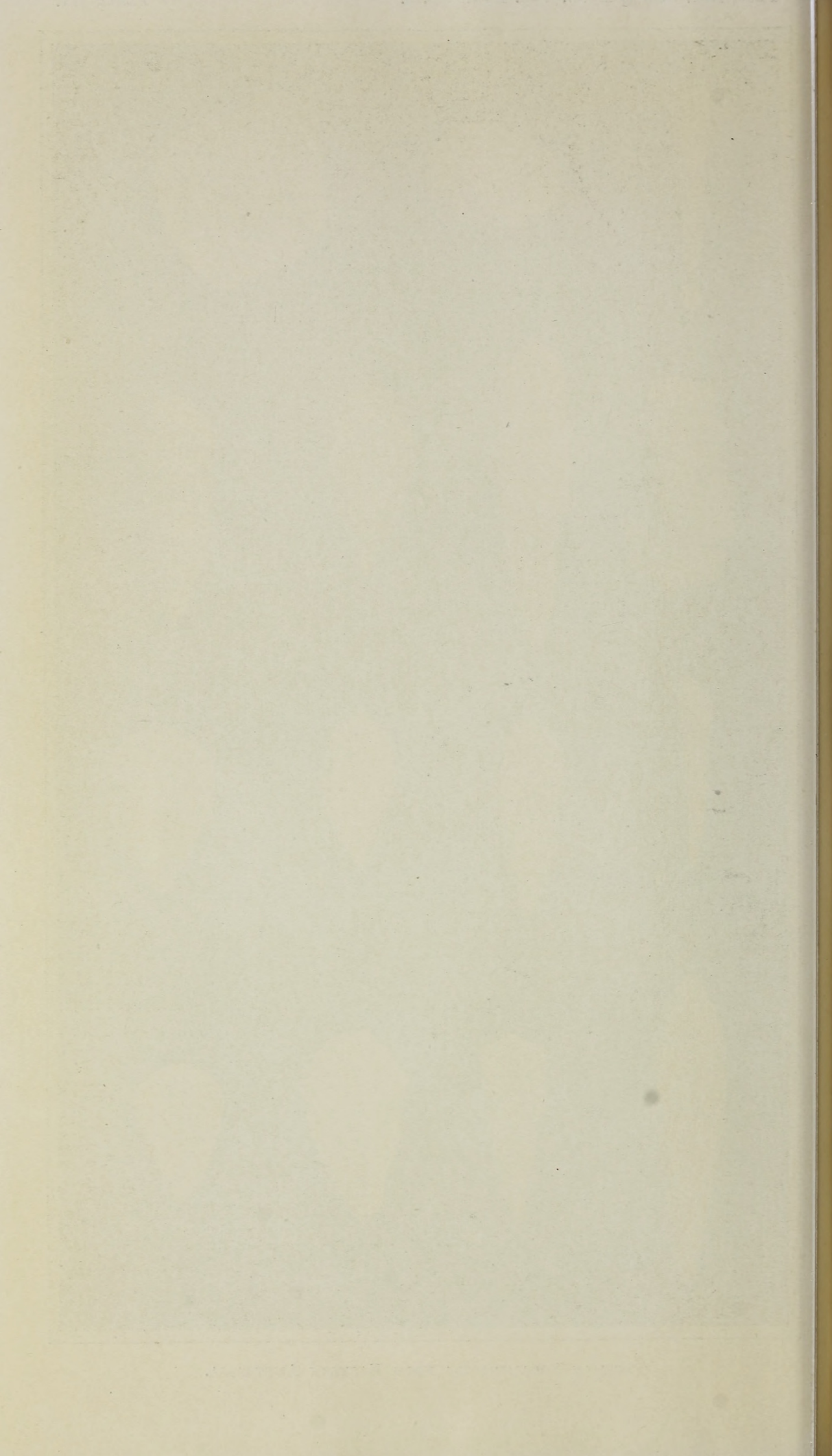
Other Localities.—*Queensland.* Lower Bowen Series: North bank of Cattle Creek, 14 miles S.E. of Springsure; Cattle Creek below Waterfall, near Springsure; Mt. Hope, 20 miles S. of Springsure; 2.5 miles from Mantuan Downs, on Springsure road; 3 miles from Cracow on road to Theodore.

REFERENCES.

- CHAPMAN, F., and HOWCHIN, W., 1905: A Monograph of the Foraminifera of the Permo-Carboniferous Limestones of New South Wales. *Mem. Geol. Surv. N.S. Wales* Pal. 14, pls. 1-4.
- , and PARR, W. J., 1934: A Revision of the Nomenclature of the Permian Foraminifera of New South Wales. *Proc. Roy. Soc. Vict.* 47, (1), N.S. pp. 175-189. Text figures.
- CRESPIN, I., 1943: Permian Foraminifera from a Bore at Coorabin, New South Wales. *Aust. Journ. Sci.* 6, (2), p. 65.
- , and PARR, W. J., 1940: Arenaceous Foraminifera from the Permian Rocks of New South Wales. *Journ. Proc. Roy. Soc. N.S. Wales* 74, pp. 300-311, pls. 12-13.
- CUSHMAN, J. A., and WATERS, J. A., 1928: Upper Paleozoic Foraminifera from Sutton County, Texas. *Journ. Pal.* 2, (4), pp. 358-371, pls. 47-49.
- HOWCHIN, W., 1894: On the Occurrence of Foraminifera in the Permo-carboniferous Rocks of Tasmania. *Australas. Ass. Adv. Sci. Adelaide Meeting* (1893), pp. 334-348, pls. 10, 11.
- , 1895: Carboniferous Foraminifera of Western Australia, with Description of New Species. *Trans. Roy. Soc. S. Aust.* 19, pl. 10.
- JONES, T. R., 1882: Catalogue of the Fossil Foraminifera in the Museum (Natural History), London.
- PARR, W. J., 1940: Foraminifera and a Tubiculous Worm from the Permian of the North-west Division of Western Australia. *Journ. Roy. Soc. W. Aust.* 27, pp. 97-111, pls. 1, 2.
- RAGGATT, H. G., and CRESPIN, I., 1940: Possibility of Heavy-Mineral Correlation of Some Permian Sedimentary Rocks, New South Wales, by Dorothy Carroll. Discussion. *Bull. Amer. Assoc. Petr. Geol.* 24, pp. 1682-1683.
- , 1941: Geological Notes on Natural Gas and Oil Corporation's Bore at Balmain, City of Sydney, New South Wales. *Aust. Journ. Sci.* 4, (3), pp. 102, 103.

EXPLANATION OF PLATE III.

- Fig. 1.—*Hyperamminoides acicula* Parr. Dry Creek, "Inglelara" property, Springsure, Queensland. Plesiotype, x 30.
- Fig. 2.—*Ammodiscus multicinctus* Crespin and Parr. Cattle Creek below Waterfall, near Springsure, Queensland. Plesiotype, x 40.
- Fig. 3.—*Calcitornella stephensi* (Howchin). Pokolbin, Hunter River District, New South Wales. Showing surface that has been attached to rock. Plesiotype, x 30.
- Fig. 4.—*Ammobaculites woolnoughi* Crespin and Parr. McDougall's Hill, Singleton, New South Wales. Plesiotype, x 30.
- Fig. 5.—*Nodosaria springsurensis* sp. nov. Cattle Creek below Waterfall, near Springsure, Queensland. Holotype, x 30.
- Fig. 6.—*Nodosaria serocoldensis* sp. nov. Cattle Creek below Waterfall, near Springsure, Queensland. Holotype, x 30.
- Fig. 7.—*N. serocoldensis* sp. nov. Locality same as holotype. Paratype, x 30.
- Fig. 8.—*Dentalina grayi* sp. nov. Lower part of exposure on Argus's Selection, Springsure, Queensland. Holotype, x 40.
- Fig. 9.—*Frondicularia parri* sp. nov. Kulnura Bore, New South Wales, at 4,203 feet. Holotype, x 40.
- Fig. 10.—*F. parri* sp. nov. Locality same as holotype. Paratype, x 40.
- Fig. 11.—*F. parri* sp. nov. Locality same as holotype. Paratype. Showing irregular character of striae, x 40.
- Fig. 12.—*F. woodwardi* Howchin. Cattle Creek below Waterfall, near Springsure, Queensland. Plesiotype, x 30.
- Fig. 13.—*F. woodwardi* Howchin. Mt. Hope, 20 miles S. of Springsure, Queensland. Plesiotype, x 30.
- Fig. 14.—*Geinitzina triangularis* Chapman and Howchin. Pokolbin, New South Wales. Microspheric form. Topotype, x 30.
- Fig. 15.—*G. triangularis* Chapman and Howchin. Pokolbin. Megalospheric form. Topotype, x 30.
-



PERMIAN OSTRACODA FROM EASTERN AUSTRALIA.

By IRENE CRESPIN, B.A., Commonwealth Palaeontologist,
Mineral Resources Survey Branch, Canberra, A.C.T.

(WITH PLATE IV.)

Communicated by O. Jones, M.Sc.

(Received 24th April, 1944; read before the Royal Society of Queensland,
31st July, 1944; issued separately, 5th February, 1945.)

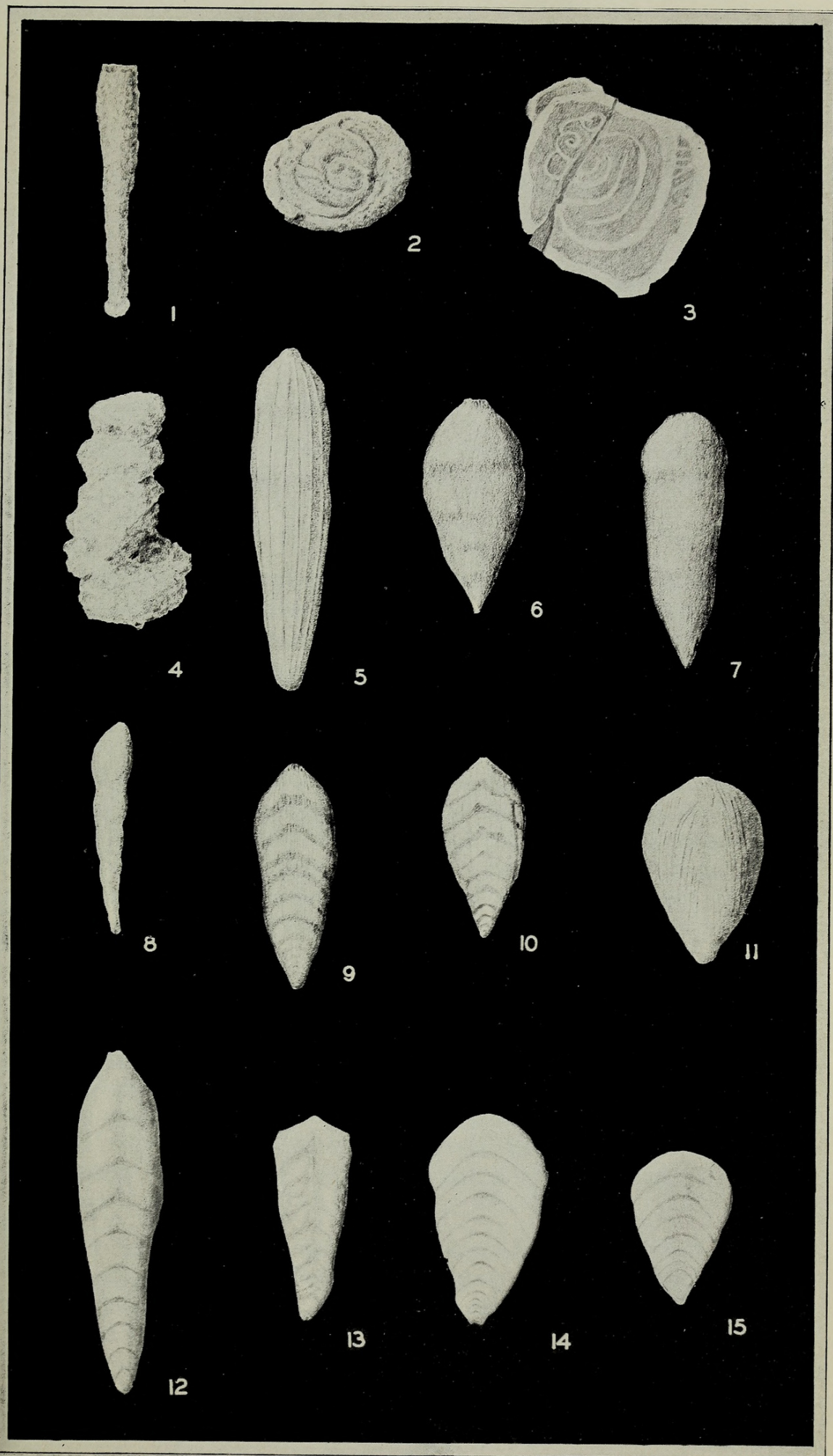
INTRODUCTION.

Only four species of ostracoda have been previously recorded from the Permian rocks of Eastern Australia. Three species were described from New South Wales by Chapman (1920), namely *Leperditia prominens* from Farley and the Caledonian Shaft at Cessnock, at 200 feet, *Primitia dunii* from the Caledonian Shaft and *Jonesina etheridgei* from Farley, and one *Entomia jonesi* by de Koninck (1898) from the Muree Sandstone. The genera *Bairdia*, *Healdia* and *Cavellina* were recently recognised by the writer in samples of "Fenestella Shale" from an open cut on Barossa road which joins Lenah Valley with Tolossa Street, Glenorchy, Tasmania, but the specimens were too poorly preserved for specific determination. Considerable investigation has been carried out on the ostracoda in America and the well illustrated publications form an excellent basis for comparison with the Australian forms.

The species herein discussed are from the Kulnura Bore, parish Kooree, county Northumberland, and from surface samples from the Hunter River District in New South Wales, and from surface sections in the Springsure area in Queensland. All the ostracoda are associated with a typical foraminiferal assemblage, including *Hyperamminoides acicula* Parr, *Calcitornella stephensi* (Howchin), *Frondicularia woodwardi* Howchin, *F. parri* Crespin and *Geinitzina triangularis* Howchin.

The following new species of ostracoda are described: *Bairdia grayi*, *Bairdia nyei*, *Healdia chapmani*, *Cavellina springsurensis*, *Cavellina aequivalvis*, *Cavellina kulnuraensis* and *Basslerella australae*.

All specimens are in the Commonwealth Palaeontological Collection at Canberra. The plate accompanying the paper has been prepared by Mr. F. Canavan, M.Sc., of the Mineral Resources Survey.



PERMIAN FORAMINIFERA FROM EASTERN AUSTRALIA.



Crespin, Irene. 1945. "Some Permian Foraminifera from Eastern Australia."
The Proceedings of the Royal Society of Queensland 56, 23–30.
<https://doi.org/10.5962/p.351697>.

View This Item Online: <https://www.biodiversitylibrary.org/item/195751>

DOI: <https://doi.org/10.5962/p.351697>

Permalink: <https://www.biodiversitylibrary.org/partpdf/351697>

Holding Institution

U.S. Department of Agriculture, National Agricultural Library

Sponsored by

U.S. Department of Agriculture, National Agricultural Library

Copyright & Reuse

Copyright Status: Public domain. The BHL considers that this work is no longer under copyright protection.

Rights: <https://www.biodiversitylibrary.org/permissions/>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.