COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS.

BULLETIN No. 54.

NEW ACONECERATINAE (AMMONOIDEA) FROM THE ALBIAN AND APTIAN OF AUSTRALIA.

BY

R. O. BRUNNSCHWEILER.

Issued under the Authority of Senator the Hon. W. H. Spooner, Minister for National Development.

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Minister: SENATOR THE HON. W. H. SPOONER, M.M.
Secretary: H. G. RAGGATT, C.B.E.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS.

Director: J. M. RAYNER.
Acting Deputy Director: H. TEMPLE WATTS.

This Bulletin was prepared for the Geological Section.

Chief Geologist: N. H. FISHER.

Issued: 16th January, 1959.

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SUMMARY.

Several species of Aconeceratinae occur in the Windalia Radiolarite (Upper Aptian) of the Carnarvon Basin of Western Australia. Two of them belong to the genus *Aconeceras* Hyatt, the third is made the type species of *Eofalciferella* nov., which is believed to be the ancestor of *Falciferella* Casey. Two new species of the latter genus have been discovered in the Upper Albian of northern South Australia. This is the first record of the genus outside England.

INTRODUCTION.

Since Whitehouse (1926b, 1927, 1928) revised the then known Cretaceous species of Eastern Australia very little has been added to our knowledge about Australian Cretaceous ammonites. Spath (1926, 1940) first recorded the occurrence of Senonian and Maastrichtian ammonoid faunas in Western Australia. The important late Albian and Cenomanian assemblages of Northern Australia (Darwin, Bathurst and Melville Islands) are still only sketchily known (Etheridge fil. 1902, 1904, 1907) and are in need of revision, as has become evident from recent bed-for-bed collecting carried out in this area by Dr. B. Daily, of Adelaide. A monograph on this magnificent assemblage will shortly be published by Dr. C. W. Wright. An Upper Albian ammonoid fauna, collected by Dr. H. Wopfner, A. Hess, D. Scott and the author (all of Geosurveys of Australia Ltd., Adelaide), has recently been dispatched to Dr. R. A. Reyment (Stockholm) for description.

The Aptian/Albian, Senonian, and early Maastrichtian faunas of Western Australia are being described by the writer and the first two parts (Neoammonoidea Irregularia) will appear under the auspices of the Commonwealth Bureau of Mineral Resources, Canberra.

The writer is indebted to the Director of the Bureau of Mineral Resources (Mr. J. M. Rayner) and the Chief Geologist (Dr. N. H. Fisher) for permission to publish the description of the Western Australian aconeceratids together with those from South Australia. Permission to publish the latter information was kindly given by the Board of Directors of Santos Ltd., Adelaide, and by the Managing Director of Geosurveys of Australia Ltd. (Mr. R. C. Sprigg).

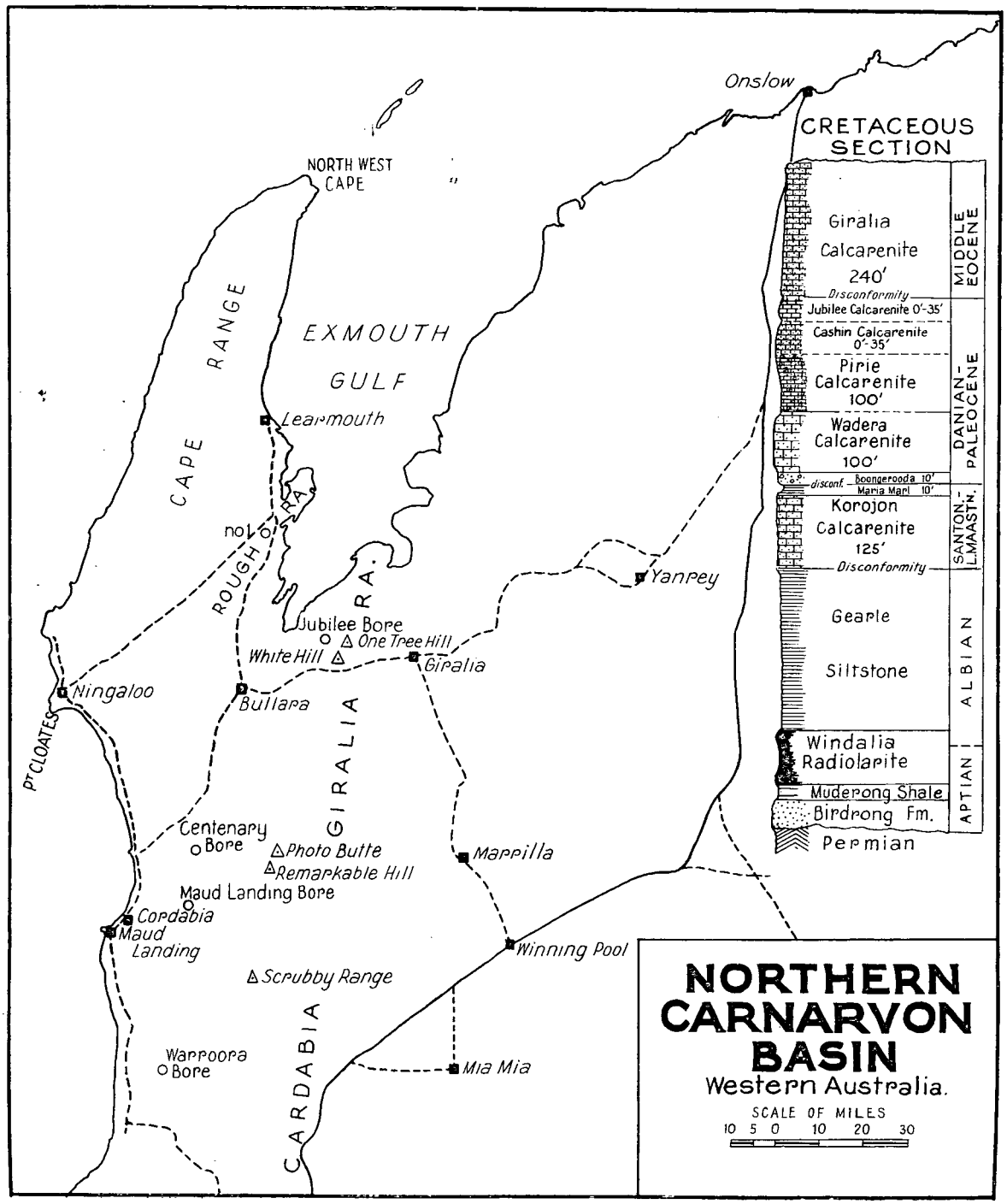
C. W. Wright, London, helped this little study with generous advice contained in numerous letters. To R. A. Reyment I am most grateful for the critical reading of and helpful comments on the manuscript.

STRATIGRAPHICAL AND ECOLOGICAL NOTES.

1. Western Australia (Carnarvon Basin).

The stratigraphy of the Carnarvon Basin, a potentially oil-bearing region, has since 1948 been vigorously pushed ahead by geologists of the Bureau of Mineral Resources and West Australian Petroleum Pty. Ltd. The writer himself took part in that work from 1949 to 1954 as a member of the Bureau. The ammonites described hereunder were all collected during that time by the author.

The Carnarvon Basin is one of the major areas of later Palaeozoic and Mesozoic/Tertiary marine sedimentation in Australia. The meridionally trending basin is about 400 miles long. Its greatest width is not known because its western part is under the Indian Ocean. At its broadest, on land, it is about 130 miles wide. The loci of thickest accumulation of sediments varied for the various depositional cycles. For each period of sedimentation (Mid/Upper Devonian, Early Carboniferous, Early Permian, Mid/Upper Jurassic, Mid/Upper Cretaceous and Tertiary) the trough axis shifted more or less parallel eastward or westward. The area of present greatest aggregate thickness is probably still doubtful and may be off the coast.



TEXT—FIGURE 1.

Text-figure 1 shows a generalized section, compiled from surface exposures and some bores, of the Cretaceous portion of the sedimentary column. For more detailed information the reader is referred to Condon (1954), Fairbridge (1953) or McWhaeetal (1958).

The Western Australian *Aconeceratinae* are all from the Windalia Radiolarite (Condon, 1954). This is a uniform sequence of more or less fine sandy and micaceous, kaolinitic to siliceous, varicoloured radiolarite which has a very low specific gravity in the weathered zone. In outcrops, up to about 120 feet of this formation can be observed, and it is known from bores that the greatest thickness is nearly 300 feet. The rock contains radiolaria and sponge spicules, but it is unlike the hard and dense radiolarites that are so common in the Alps. Ammonites and pelecypods are fairly common and they occur almost without exception as casts and moulds because all calcareous matter has been leached. Most of the larger and many of the smaller ammonites are more or less crushed. In one case this has caused the misidentification as *Utaturiceras vicinale* (Stoliczka) of what is most likely to be a new species of the genus *Tropaeum*—whence my incorrect placing of the Windalia Radiolarite in the Upper Cenomanian (Condon, 1954, p. 111). The overwhelming evidence afforded by the subsequently discovered *Aconeceratinae* eventually demonstrated the Upper Aptian plus probably Lower Albian age of the formation, and the true nature of the "*Acanthoceratidae*" was thence also recognized.

In the Windalia Radiolarite the ammonites are represented by the following species:—

Upper part of formation: *Tropaeum* sp. ind., *Paracanthoplites* sp. nov.

Middle part of formation: *Tropaeum* sp. nov., *Aconeceras whitehousei* sp. nov., *Eofalciferella condoni* gen. et sp. nov.

Lower part of formation: *Tropaeum* sp. ind., *Aconeceras austronisoides* sp. nov.

The aconeceratids were all found in the same section, *A. whitehousei* occurring about 60 feet higher than *A. austronisoides.*

Rocks similar to the well-bedded, although poorly fissile, Windalia Radiolarite are very characteristic of much of the Australian Middle Cretaceous. Not only in Western Australia but also in the Darwin area and in the Great Artesian Basin of Eastern Australia varicoloured lightweight radiolarites and siltstones make up considerable portions of the Aptian and Albian sequences. In some areas there are almost pure kaolinites, in others the rock consists of as much as 95 per cent. silica (partly bound in kaolinite). These rocks, which are macroscopically quite alike, grade laterally and vertically into each other over immense areas. They are, incidentally, responsible for the most prominent among the "duricrust" beds in the arid and semi-arid regions of Australia, and in them occur also the most important opal fields.

On the whole the peculiar conditions producing this lithology seem to have been limited to the Aptian and Albian epochs. But there are occasional beds of that type in the Upper Jurassic of the Canning Basin (Brunnschweiler, 1954) and the lithology seems to persist for a time also into the earliest period of the Upper Cretaceous (Winton Formation of Western Queensland). The type of environment indicated by it is still a matter for speculation.

2. NORTHERN SOUTH AUSTRALIA.

The beds which contain the *Aconeceratinae* in South Australia form part of the Aptian/Albian marine sequence in the Great Artesian Basin. This marine sequence consists of two major parts which are known as the Roma Formation—covering most of the Aptian—and the Tambo Formation (Upper Albian) (Whitehouse, 1954). Evidence of a discontinuity between the two formations is fairly conclusive in some marginal parts of the basin, but it is doubtful in more central regions.

Lithologically both Cretaceous formations are very similar. They consist largely of soft micaceous and glauconitic mudstones, more or less sandy siltstone, and shale with rather few and thin, commonly lensing, sheets of poorly consolidated fine sandstone and occasional, thin, patches and sheets of usually marly limestone. Throughout the series pyrite and gypsum (mostly selenite) are common, the former finely dispersed, the latter in thin concordant layers and in discordant veins. Barytes and celestite, both in layers and in concretions, occur at various levels.

The recently much intensified search for oil in the South Australian part of the Great Artesian Basin is yielding new knowledge from systematic core drilling in the richly fossiliferous Cretaceous. The two species of *Falciferella* Casey were discovered in the Albian part of Santos Limited's Oodnadatta No. 1 Well. Details of the section encountered cannot yet be given but it can be stated that in this area there is a most conspicuous faunal difference between the Tambo and the Roma Formations. While the knowledge of this difference is not new (Whitehouse, 1926a; Bryan and Jones, 1946) one would hardly have expected it to be so sharp a caesure as has now been revealed by the Oodnadatta well. Moreover, very interesting details about the nature and the probable cause of the faunal discontinuity have also been revealed.

The Tambo Formation is about 600 feet thick and is characterized throughout by countless individuals of the pelecypod genus *Aucellina* in all growth stages and of *Inoceramus*. The *Aucellina* forms display an evolutionary series in the shape of the smaller right valve. Neither of these two genera (nor other associated pelecypods and gastropods) has as yet been met with in the underlying Roma Formation. *Falciferella* is another common genus in the basal 150 feet of the Tambo Formation. Exactly as in the Gault of Southern England (Casey, 1954) there are countless very small individuals (3 to 10 mm. diam.) which can almost always "be picked out by the more metallic gleam of the nacre as compared with that of other ammonites in the same bed" (Casey, 1954), though in our cores other ammonites are in fact rather rare.

In the Aptian Roma Formation, several hundred feet of which have been penetrated in the Oodnadatta well, neither *Aucellina* nor *Inoceramus* nor, of course, *Falciferella,* is present. In fact, the whole fauna of the Aptian is entirely different. To date not a single molluscan species has been found to linger on from the Aptian into the Albian. Among the Belemnoidea, *Dimitobelus* and *Tetrabelus* are Albian here (but see Bryan and Jones, 1945, for Queensland), *Peratobelus* and a new clavate genus with a remarkable array of intersecting lateral lines are restricted to the Aptian. Pelecypod genera found exclusively in the Aptian here are *Maccoyella,* the nuculid *Malletia, Cyrenopsis,* and *Fissilunula.* Another typical Roma form, *Isocrinus australis* (Moore), was also discovered in our bore cores. On the other hand, the so characteristic, translucent and paper-thin *Pseudavicula anomala* (Moore) is abundant in the Albian Tambo Formation and entirely absent in the Aptian. No Aptian ammonites have yet been encountered in the cores.

Between the latest Aptian and the earliest Upper Albian fossiliferous beds there is a highly glauconitic sequence, about 50 feet thick, in which there are no molluscs at all. This interval was nevertheless one of marine sedimentation, because numerous brachiopods (*Lingula, Terebratella*) occur throughout the sequence, which is steeply cross-bedded where sandy, more or less horizontal where shaly or calcareous. It seems therefore that the faunal discontinuity between the Roma and the Tambo Formation was, in this area, brought about by peculiar environmental changes within the marine realm itself rather than by a regression and consequent non-deposition or even erosion. Despite a fine layer (3 cm.) of gritty to fine pebbly sandstone near the top of the sequence there is no conclusive evidence of a real emergence between Aptian and Albian.

SYSTEMATIC DESCRIPTIONS.

1. ACONECERATINAE FROM WESTERN AUSTRALIA.

ACONECERAS Hyatt 1903.

ACONECERAS AUSTRONISOIDES sp. nov.
(Plate I, fig. 1a, b.)*

Holotype: CPC 2626—monotypic.

Horizon and locality: An estimated 20 feet above the base (not exposed at this locality) of the Windalia Radiolarite at its type locality, i.e., the western slope of Windalia Hill on the Lyndon River, Carnarvon Basin.

Diagnosis: A rather large *Aconeceras* with extremely compressed high whorls; a high, finely serrate, floored keel, and a very narrow umbilicus.

Dimensions: Greatest diameter, including keel, 52 mm.

At diam. (excluding keel): 45 mm.;	(including keel):	50 mm.
Whorl height (% of diam.) 64	:	60
Whorl width (% of diam.) ca. 13	:	ca. 12.
Umbilicus (% of diam.) ca. 5	:	ca. 4.

Because of the slightly distorted shape of the holotype these measurements are only approximate, but the whorls are undoubtedly extremely compressed in this species.

Additional Descriptive Notes: The holotype is the only specimen available of this new species. It consists in part of the external mould and in part of the internal cast which, together, permit of satisfactory reconstruction of this extremely compressed discoidal form. The ornament is weak on the early whorls but later quite like that of the typical *Aconeceras*. It consists of rather sharply angulate, falcate striae and feeble, flattish ribs which are strongest on the outer part of the flanks, attenuating and disappearing both towards the venter and towards the umbilicus. The sides of the whorl are gently convex on the upper third, i.e., as far down as the forward kinks of the falcate ornament. From there to the low and vertical umbilical wall the sides are first slightly concave and thereafter flat. The keel is high and thin like a fine saw blade. It is floored but apparently not hollow. On the last portion of the body

* All figures are pencil drawings by the author. The specimens could not be extricated from the rock and, because they are countersunk partly as mould, partly as cast, proper lighting for photography is not possible. Finer details of the ornament would be lost.

chamber the crenulation of the keel becomes coarse and irregular like a coxcomb crest and the height decreases markedly. The whorls have no distinct ventral shoulders but there is a slight groove at the base of the keel.

The aperture is partly preserved as an external mould. It is plain with short and broad lateral lappets. The species possesses probably also a short ventral lappet, but it is broken away on the holotype. The suture is not visible.

Remarks: Of the larger species of the genus, the Australian *A. walshense* (Tenison-Woods), is, as might be expected, most similar (*see* Whitehouse, 1926b, 1927), but it has a slightly less compressed whorl section (15–18%) and a markedly wider umbilicus (8–14%). Its ornament is less angulate, and the costulae are more conspicuous on the lower half of the flanks, not on the upper as in *A. austronisoides.* The latter is in this respect much more like *A. nisoides* (Sasarin) as figured in Casey (1954). On the Western Australian species there is, however, a faint but distinctive trace of the concentric lirae that are also present on the holotype of *A. walshense.* The keel of *A. austronisoides* is the most distinguishing feature; on *A. walshense* there is no indication that it is serrate and floored, as I have recently seen on excellent new material from North-west Queensland kept at the University of Melbourne.

ACONECERAS WHITEHOUSEI sp. nov.

(Plate 1, fig. 2a, b.)

Holotype: CPC No. 2627a—monotypic.

Horizon and locality: 60 feet higher than *A. austronisoides,* i.e., Windalia Radiolarite at its type locality, but on the eastern slope of Windalia Hill on the Lyndon River, Carnarvon Basin. On the same slab and bedding plane with and partly cloaked by the holotype of *Eofalciferella condoni* sp. nov.

Other Occurrences: Walsh River, Queensland—(*A. walshense* pars in Whitehouse, 1927, p. 114, text-fig. 1, Pl. 16, fig. 3).

Diagonsis: A large *Aconeceras* with narrow and non-shouldered umbilicus and high, very compressed whorls which have gently convex or almost flat sides. Test smooth. Keel high, entire, floored but not hollow.

Dimensions: Greatest diameter, including keel, estimated at 77 mm.

At diam. (excluding keel):	64 mm.	(including keel): 71 mm.
Whorl height (% of diam.):	56	55
Whorl width (% of diam):	ca. 10	ca. 9
Umbilicus:	ca. 9	ca. 8

Additional Descriptive Notes: The holotype and only specimen consists of a combination of external moulds and internal casts. It is slightly crushed in the central area so that the ventral shoulders of the earlier whorls leave a slight impression on the last whorl side. The keel is very narrow, blade-like, and leaves low, but distinct, ventral shoulders. There is no true umbilical wall nor shoulder; the whorl sides descend gradually towards the umbilical seam.

The main lateral and external elements of the suture are visible at whorl height 26–30 mm. (excluding keel). As far as can be seen their features are the same as those of the genus.

Remarks: This species differs by its dimensions, its quite smooth shell, and its high, floored and non-serrate keel from all extra-Australian species. There is a Queensland form, regarded by Whitehouse (1927, p. 114, Pl. 16, fig. 3, and text-fig. 1) as a variety of *A. walshense* (Tenison-Woods), which is very close indeed to and in my opinion conspecific with *A. whitehousei.* Whitehouse's specimen (Queensland Museum Coll. No. F 1704) has the following dimensions:—

At diam. 105 mm: Whorl height 56%, width 15% (+), Umbilicus 8%.

At diam. 72 mm.: Whorl height 57%, width 18%, Umbilicus 11%.

There is an obvious difference in the degree of compression, but this may well be due to a slight underestimation on my part of the whorl thickness in the Western Australian form, which cannot be extricated from the matrix and is slightly crushed. In general appearance the two would be indistinguishable if the Queensland form had its keel fully preserved.

Whitehouse (1927, p. 114) was undecided whether his variant should be taxonomically separated, all the more as the exact stratigraphical position of these Queensland specimens has never been known. Yet the Western Australian occurrence shows that there is such a smooth, high-keeled, extremely discoidal species with tight umbilicus and that it is evidently younger (" by 60 feet ") than the aconeceratids with the true *nisoides-walshense* type of ornamant.

Genus EOFALCIFERELLA nov.

Type species: *Eofalciferella condoni* sp. nov.

Diagnosis: A rather large, keeled and shouldered genus of the *Aconeceratinae.* Keel high, entire, floored; whorls very compressed with greatest thickness in upper half, lower half of flanks flat or concave; a conspicuous mediolateral concentric sulcus separating the two differing areas on the flanks. Umbilicus very narrow, wall steep and low. Test ornamented only on upper half of flanks with broad, very low, fairly closely set, biconcave falcoid ribs and, on body chamber, with strigae. Suture of simplified *Aconeceras* pattern with narrow lobes; four simple and shallowly divided saddles visible on sides, i.e., as in *Falciferella.*

Remarks: If it were not for the prominent keel and the large size this new genus could without doubt be incorporated in *Falciferella* Casey 1954, which, as shown below, occurs in the Upper (and probably Middle) Albian of the Great Australian Artesian Basin. The derivation of *Falciferella* from *Eofalciferella* seems an almost inescapable conclusion; the latter, because of its association with *Aconeceras, Tropaeum,* and *Paracanthoplites,* is evidently older than *Falciferella.*

EOFALCIFERELLA CONDONI sp. nov.

(Pl. 1, figs. 3 & 4.)

Holotype: CPC No. 2627b.

Horizon and Locality: 60 feet higher than *Aconeceras austronisoides* sp. nov., i.e., about 80 feet above the base of the Windalia Radiolarite at its type locality, but on the eastern slope of Windalia Hill on the Lyndon River, Carnarvon Basin. On the same slab and bedding plane and partly cloaking the holotype specimen of *Aconeceras whitehousei* sp. nov.

Dimensions: Greatest diameter, including keel, estimated at 46 mm.

At diam. (excluding keel)	41 mm.	(including keel) 45 mm.
Whorl height (% of diam.):	63	62
Whorl width (% of diam.):	ca. 12	ca. 11
Umbilicus:	ca. 8	ca. 7

Description: In addition to the features included in the diagnosis of *Eofalciferella* nov., of which this species is the type, it may be mentioned that the low, but distinct, ventral shoulders are wavy because the ribs overlay each other like shingles. On the body chamber the whorl sides may be divided in four distinct zones: (a) the gently convex, ribbed and strigate, upper half, (b) the narrow concentric groove on the middle of the flanks, (c) a flat zone, a little less than one-fourth of the whorl height wide, on which the ornament consists of very faint and downward disappearing striae, and (d) a flat or slightly concave, completely smooth, lowest zone reaching to the umbilical shoulder. This lowest zone is set off from zone (c) by a tiny concave slope.

Towards the earlier whorls zone (c) is entirely without ornament and the ribbing on zone (a) becomes very weak, but the mediolateral sulcus remains conspicuous also on the earlier whorls.

Remarks: This form was at first believed to belong to *Sanmartinoceras* Bonarelli (whence the mention in Wright, 1957), but neither the dimensions nor the biconcave ornament with its concentric mediolateral sulcus compare closely with any known species of *Sanmartinoceras*. In addition, there is this—for a large species—conspicuously simplified suture, which points to *Falciferella*. Actually, this new form from Western Australia fits in no known genus of the *Aconeceratinae* and therefore *Eofalciferella* nov. was established for it.

The species is named after M. A. Condon, Assistant Chief Geologist, Bureau of Mineral Resources, Canberra, who was in charge of the stratigraphical work in the Carnarvon Basin.

2. Aconeceratinae from northern South Australia.

To date the only species of the Aconeceratinae known for certain from South Australia is *Sanmartinoceras fontinale* (Hudleston), the holotype of which came from near Primrose Springs, an artesian mound spring on the lower Neales River, about 70 miles south-south-east of the locality of the material described below. Primrose Springs appears to be a locality in the upper part of the Aptian Roma Formation. However, since the true *locus derivatio* of *S. fontinale* is not known, and the Albian Tambo Formation occurs too in this area, one cannot yet be quite certain about the Upper Aptian age of this species.

The discovery of *Falciferella* Casey in bore cores near Oodnadatta makes it possible to identify the two small, non-carinate, smooth or faintly falcoid striated "*Haploceras sp.*" from Dalhousie Springs (an Albian locality), described by Etheridge fil. (1905).

Genus Falciferella Casey 1954.

Diagnosis (Casey, 1954): Micromorph platycones with narrow, sharp-rimmed umbilicus and tabulate venter, feebly carinate in early youth. Test with strongly falcoid lineation or sub-costation, and a faint spiral groove at the middle of the sides. Mouth border plain. Suture-line of simplified *Aconeceras* pattern, with reduced auxiliary elements.

FALCIFERELLA BREADENI sp. nov.

(Plate 1, figs. 5 & 6.)

Holotype: South Australian Museum P. 12407.

Other Material (also in South Australian Museum): Paratype P. 12408, Topotype P. 12410.

Horizon and Locality: The holotype from Santos Limited's Oodnadatta No. 1 Well, 10 miles north-west of Oodnadatta, at 245 feet 2 inches; topotype from same well at 292 feet 3 inches. Many juvenile specimens not specifically determinable (3 to 10 mm.) between 235 feet and 372 feet. All specimens collected by the author.

The beds from the surface down to about 375 feet contain also *Myloceras, Labeceras, Appurdiceras, Boliteceras,* &c., and are to be regarded as early Upper Albian according to Whitehouse (1926).

Diagnosis: A very compressed species of *Falciferella* with rather strong, broadly rounded, dorsolaterally and ventrally attenuated falcoid ribbing and striation on body chamber. On the phragmocone the ventrolateral ornament is lost and only very weak prorsiradiate striae remain close to the umbilical shoulder. On the earlier whorls these striae disappear too. Venter smooth and flat on early portion of body chamber; near the aperture, however, the ribs cross the venter in the form of weak folds. Lateral spiral groove wide and shallow. Mouth border with a very small, but sharply protruding, lateral, and a short ventral, lappet.

Dimensions: At greatest diameter—

Diameter (Holotype) 22 mm.

Whorl height (% of diam.) 50.

Whorl width (% of diam.) ca. 14.

Umbilicus (% of diam.) 14.

The paratype has almost identical dimensions.

Additional Descriptive Notes: The holotype consists of a nearly perfect external mould of the complete specimen. Within this mould the body chamber is preserved in a crushed condition; it takes up slightly more than half of the last volution. The septa are visible, though poorly defined. The lateral spiral groove is at the bottom of the upper third of the flanks, i.e., it does not follow the loci of the adorally produced linguae of the falcoid ornament; the latter are about the middle of the sides. The umbilical wall is vertical and the shoulder angular. On the earlier whorls the umbilicus becomes wider. The ventral shoulders round sharply into the convergent ventrolateral part of the flanks. Lowest part of flanks, near umbilicus, slightly concave.

The suture, taken from a fragmentary topotype (Pl. 1, fig. 6) at 10 mm. whorl height, is much simpler than that of the type species of the genus (Casey, 1954). The lateral lobes show no more than just an indication of incisions at the bottom, but this suffices to show that the first lateral lobe is trifid, the second bifid, i.e., true to type. The saddles, of which the second lateral (= first lateral in Casey, 1954) is the largest, also show no more than crenulation which is asymmetrically bifid; the asymmetry in the second lateral saddle tends to make the foliole on the side of the second lateral lobe larger. The auxiliary elements are entire, and ascend, again true to type, obliquely forward towards the umbilical shoulder. The dorsal portion of the suture is unknown.

Remarks: This is the second species of the genus *Falciferella* to be made known, and it appears to be fairly closely related to the Middle Albian type species *F. millbournei* Casey. *F. breadeni* is more compressed; its ornament is not only stronger, but differs also in the characters of the lateral spiral groove; and its suture seems simpler.

The species is named in honour of Miss Molly Breaden, the hospitable owner-manager of Todmorden Cattle Station, 60 miles north-west of Oodnadatta.

FALCIFERELLA REYMENTI sp. nov.

(Pl. 1, figs. 7 & 8.)

Holotype: South Australian Museum No. P. 12409 (holotype and topotype on same piece, but marked H & P respectively).

Horizon and Locality: Holotype and topotype on same core surface from Santos Limited's Oodnadatta No. 1 Well, 10 miles north-west of Oodnadatta, at 235 ft. 5 in., in beds of Upper Albian age. All specimens collected by the author.

Diagnosis: A *Falciferella* that shows falcoid ribbing only on the adapical portion of the body chamber and the nearby adoral part of the phragmocone, where there are from four to six rather broad, flattened ribs that are prominent only on the lower half of the sides. Two or three of them may reach, although attenuated to scarcely detectable striae, the ventral shoulders. Mouth border plain with the broad lateral lappets less angular than in the type species of the genus. Lateral spiral groove thin and weak.

Dimensions at Greatest Diameter:

Diameter (Holotype) 16 mm.

Whorl height (% of diam.) 53.

Whorl width (% of diam.) 19.

Umbilicus (% of diam.) 13.

The topotype has almost identical dimensions.

Additional Descriptive Notes: Holotype and topotype are external moulds. Venter broad, smooth, and with angular shoulders. Upper two-thirds of sides flat or slightly concave, lower third convex; greatest whorl width at about one-third up the flanks from the sharp-rimmed umbilical shoulder. Umbilical wall low and steep. Aperture with short ventral and broad, only gently forward-curving, lateral lappets.

The suture-line is like that of *F. breadeni,* i.e., simpler than on *F. millbournei* Casey. It has a very wide ventral and a narrow lateral lobe. The ventral saddle is low and broad (Pl. 1, fig. 7); the first lateral saddle erect and with bifid crenulation; the second lateral saddle, which dominates the whole suture, shows asymmetrically bifid crenulation and stands slightly oblique, leaning towards the lateral lobe. The auxiliary elements appear fused into an almost entire broad saddle between two shallow lobes. Part of this feature may be due to rather poor preservation but there is little doubt that the simplification of the suture has gone far in this, the latest species of *Falciferella.* The internal portion of the suture is not known.

Remarks: F. reymenti appears in the uppermost levels of the beds that contain *F. breadeni* and, therefore, seems to be derived from it. In the ammonite fauna from

the limestone outcrops on Wooldridge Creek (8 miles north-west of Santos' well) there are several micromorph aconeceratids that belong to the genus *Falciferella.* They are all smooth or very nearly so and show no trace of the mediolateral spiral groove. When they show any indication of falcoid striation or ribbing at all it is always on the dorsolateral part of the flanks as in *F. reymenti.* On the internal limestone casts from Wooldridge Creek the sutures are much better preserved than on the mudstone moulds from the well cores. Unless the casts represent another species it would indicate that the frilling of the sutural elements on both *F. breadeni* and *F. reymenti* is not quite so primitive as described above and that the general pattern is in this respect not greatly different from that on *F. millbournei.*

The Wooldridge Creek material is now in the able hands of R. A. Reyment (Stockholm), who will presently describe it. In the meantime its aconeceratid micromorphs are tentatively included in *F. reymenti,* the species being named consolatorily and in honour of my friend in Stockholm, who, because of the extremely fragile nature of the bore core specimens, had to be deprived of the pleasure of describing and announcing an interesting little palaeontological discovery.

The Wooldridge Limestone lies in the upper part of the sequence with *F. breadeni.* This is some more circumstantial evidence regarding the identity of its aconeceratid micromorphs.

A very poorly preserved but apparently quite smooth *Falciferella* was found also some 40 miles west of Oodnadatta by Dr. H. Wopfner in beds near the very top of the Upper Albian of this region, i.e., an estimated 150 feet higher in the section than the Mid-Upper Albian limestones at Wooldridge Creek. This indicates that the genus *Falciferella* was well established in both Middle and Upper Albian times.

The discovery of *Falciferella* in the Australian " Gault " shows anew the world-wide distribution of the Aconeceratinae, which now are known to range from Hauterivian (Casey, 1954) to late Albian, and their obvious usefulness as reliable index fossils.

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Figure 1. *Aconeceras austronisoides* sp. nov.
(1a)—Holotype, CPC 2626.
(1b)—Holotype, cross section of last whorl near aperture.

Figure 2. *Aconeceras whitehousei* sp nov.
(2a)—Holotype, CPC 2627a.
(2b)—Holotype, cross section of last whorl at (A).

Figure 3. *Eofalciferella condoni* sp. nov.
(3a)—Holotype, CPC 2627b.
(3b)—Holotype, cross section of last whorl at (C).

Figure 4. *Eofalciferella condoni.*
Suture-line of holotype.

Figure 5. *Falciferella breadeni* sp. nov.
(5a)—Holotype, at (B) note the small but sharply protruding lateral lappet.
(5b)—Holotype, cross section of last whorl near aperture.

Figure 6. *Falciferella breadeni.*
Suture-line of a fragmentary topotype at 10 mm. whorl height x 2.

Figure 7. *Falciferella reymenti* sp. nov.
(7a)—Holotype.
(7b)—Holotype, cross section of last whorl near aperture.

Figure 8. *Falciferella reymenti.*
Suture-line of holotype near the end of phragmocone.

All figures natural size except Figure 6.

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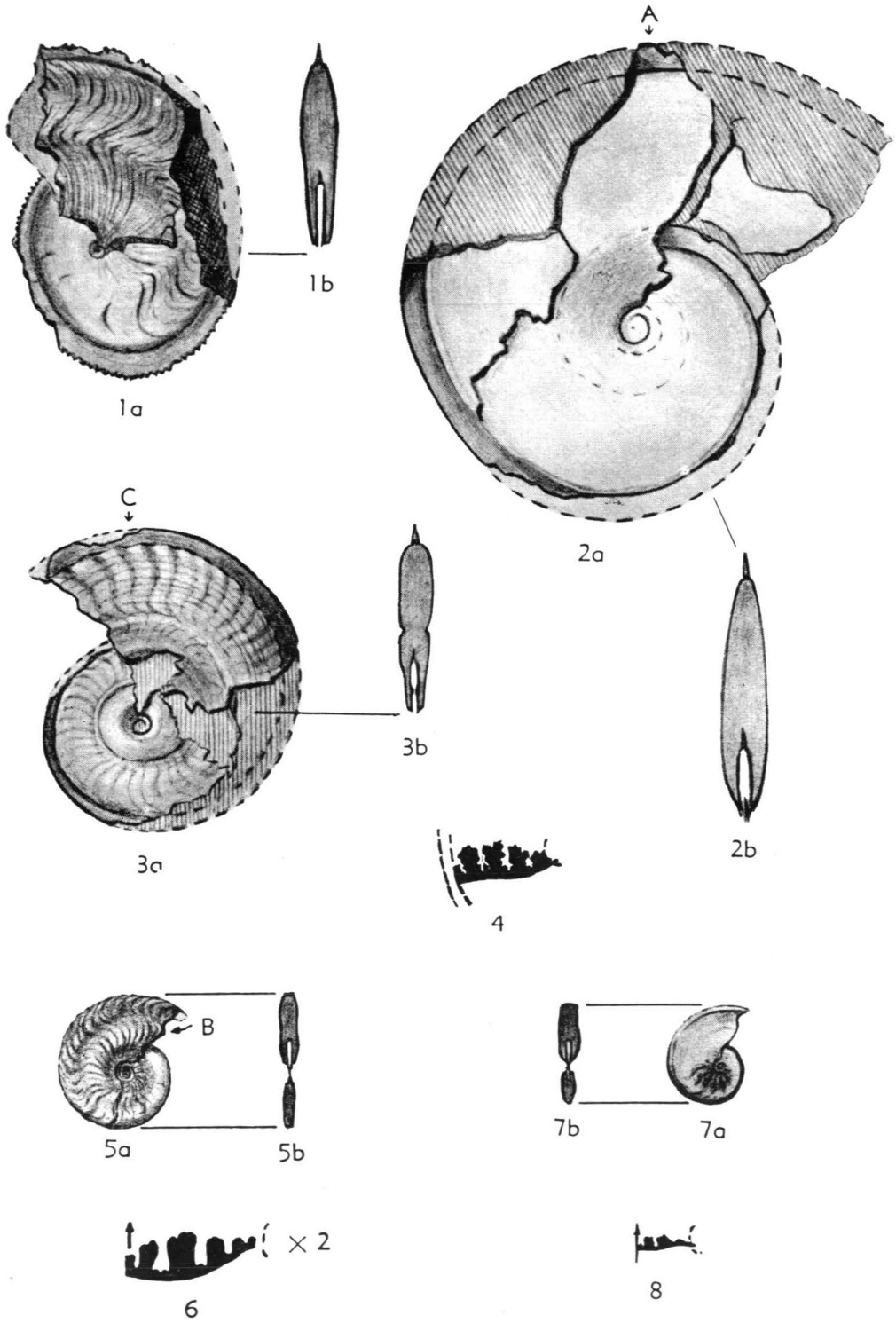
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