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LATE MIDDLE CAMBRIAN AGNOSTID TRILOBITES FROM THE  
GUNNS PLAINS AREA, NORTH-WESTERN TASMANIA

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(with one table, three text-figures and two plates)

ABSTRACT

Ten species of agnostid trilobites, including a new species, *Utagnostus(?) nevel*, are described from two localities within the lower sedimentary succession of the Radfords Creek Group, Dial Range Trough, north-western Tasmania. The faunas from both localities (near Gunns Plains) are of late Middle Cambrian age; one is either of the *Lejopyge laevigata* II Zone or the *L. laevigata* III Zone and the other is either of the *L. laevigata* III Zone or the *Damesella torosa-Ascionepea janitrix* Zone.

INTRODUCTION

The purpose of this paper is to describe all known undescribed agnostid trilobites from the lower sedimentary sequence of the Radfords Creek Group of the Dial Range Trough, north-western Tasmania. Two localities are involved, (fig. 1): (i) road cuttings on the main road to Gunns Plains (lat. 41°16.1'S, long. 146°03.7'E) and (ii) an old timber track on the western side of the Leven River (lat. 41°15.4'S, long. 146°04.2'E).

STRATIGRAPHY

The Radfords Creek Group consists essentially of an upper and a lower sedimentary sequence separated by the keratophyric Applebee Volcanics (Burns 1964). The lower sedimentary succession is best exposed in what Burns (1964) termed the Sugarloaf Gorge, particularly along cuttings of the main road to Gunns Plains, and along an old timber track along the western side of Sugarloaf Gorge.

In the Sugarloaf Gorge area near Gunns Plains, Banks (1956) and Burns (1964) and the writer have measured part of the lower sedimentary sequence of the Radfords Creek Group (Table 1). The total thickness of the Radfords Creek Group exposed in this sequence (units 2 to 15) is about 765 metres. Burns (1964, p.48) noted a thickness of about 380 metres for the same sequence. He considered that even this thickness was excessive and that it was due largely to tectonic repetition. Tectonic repetition is probable (see below), but not to the extent suggested by Burns. An inspection of the outcrops along Gunns Plains Road in Sugarloaf Gorge indicates that units 10, 11, 12, 13, 14 and the upper part of unit 15 (a thickness of over 200 metres) are in continuous sequence with only minor faulting. Unit 15 appears to have a stratigraphic thickness of 460 metres along the road, although outcrop is discontinuous and there is the possibility of repetition by faulting.

Fossils have been found in three of the units noted in Table 1. Banks (1956) reported *Clavagnostus* from unit 15. The writer was unable to relocate *Clavagnostus* but found a single, poorly preserved, almost complete specimen of *Tasagnostus* sp. about 10 metres from the top of unit 15. Unit 13 is moderately fossiliferous with only trilobites being found to date (with the possible exception of one echinoderm plate, see pl. 2, fig. 8). Agnostid trilobites described herein from unit 13 are *Hypagnostus* cf. *brevifrons* (Angelin), *Pseudophalacroma(?)* sp., *Ptychagnostus (Goniagnostus)* sp.,

Middle Cambrian agnostid trilobites from Gunns Plains, Tasmania

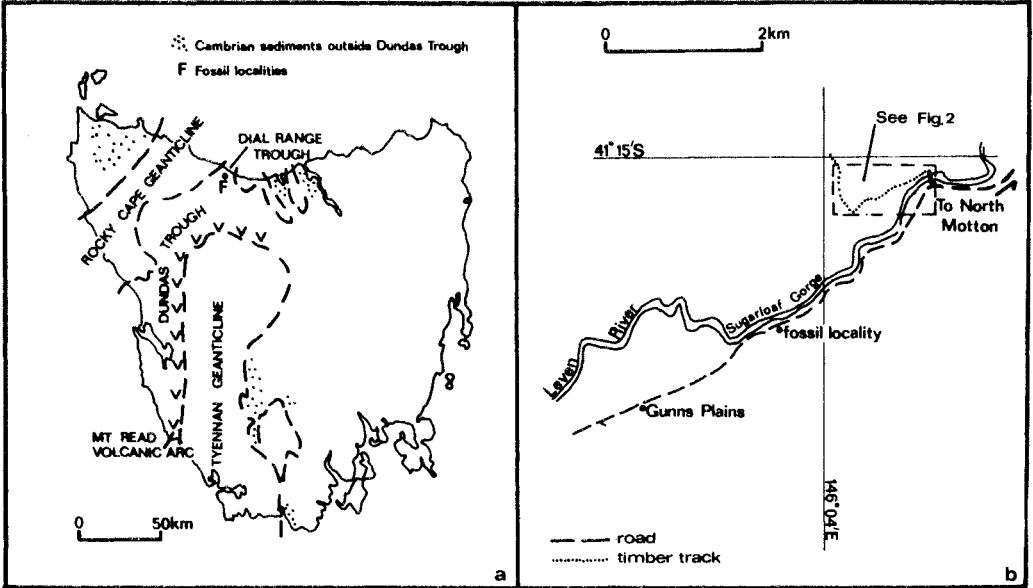


FIG. 1 - (a) Tasmanian Cambrian palaeotectonic framework (after Corbett *et al.*, 1972) (b) Locality map.

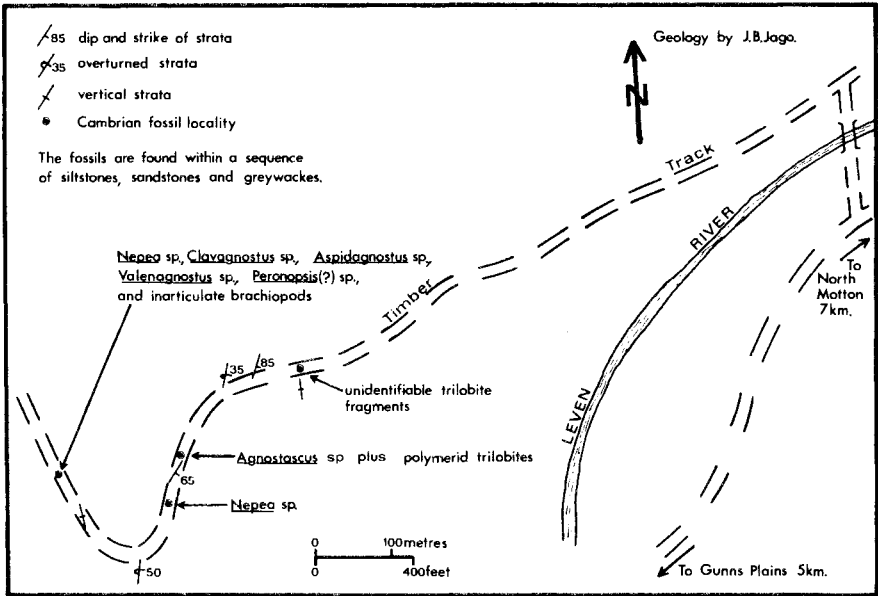


FIG. 2 - Geological sketch map of an area along an old timber track on the west side of Sugarloaf Gorge.

TABLE 1

## SECTION THROUGH RADFORDS CREEK GROUP IN THE SUGARLOAF GORGE

(near lat. 41°16.1'S, long. 146°03.7'E)

(Modified after Banks 1956, Burns 1964)

| <u>UNIT</u>  | <u>METRES</u> |
|--|---------------|
| Top  |               |
| Gordon Limestone (June Group)  |               |
| Fault  |               |
| 1. "West conglomerate" (June Group)  | 37            |
| Inferred unconformity  |               |
| 2. Brecciated greywacke  | 26            |
| Major Fault  |               |
| 3. "Middle conglomerate"   | 13            |
| 4. Mudstone with <i>Ptychagnostus</i> near top   | 22            |
| 5. Tuff  | 5.5           |
| 6. Mudstone  | 18            |
| 7. Greywacke   | 4             |
| 8. Mudstone  | 33            |
| 9. Greywacke sandstone, conglomerate and tuff  | 14            |
| Major Fault  |               |
| 10. "East conglomerate"  | 23            |
| 11. Mudstone   | 19            |
| 12. Tuff, lava   | 19            |
| 13. Argillite with <i>Lejopyge</i> , <i>Ptychagnostus</i> , <i>Pianaspis</i> (?)<br><i>leveni</i> , etc. | 90            |
| 14. Tuff and lava  | 19            |
| 15. Argillite with <i>Tasagnostus</i> (near top)   | <u>460</u>    |
| Break ??   | <u>802.5</u>  |
| Sprent Formation   |               |
| Base   |               |

N.B. The unit numbers are the same as given by Burns (1964, p.47).  
They are retained for the sake of uniformity.

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?*Lejopyge laevigata* (Dalman), *L.l. armata* (Linnarsson), *Utagnostus*(?) *nevel* sp. nov. and *Diplagnostus* sp. *Pianaspis*(?) *leventi* Jago was described in Jago (1974b). There are also a large number (Table 2) of unassigned effaced agnostids, which probably belong in either ?*Lejopyge laevigata*, *L.l. armata*, or *Pseudophalacroma*(?). The distribution of the trilobites in unit 13 is shown in figure 3. The palaeoecological significance of this distribution is discussed in Jago (1973). This fauna is probably of *Lejopyge laevigata* II Zone or *L. laevigata* III Zone (Jago 1974b). The discovery by the writer of one specimen of *Ptychagnostus* (too poorly preserved to figure or describe) near the top of unit 4 lends some support for Burn's suggestion of tectonic repetition.

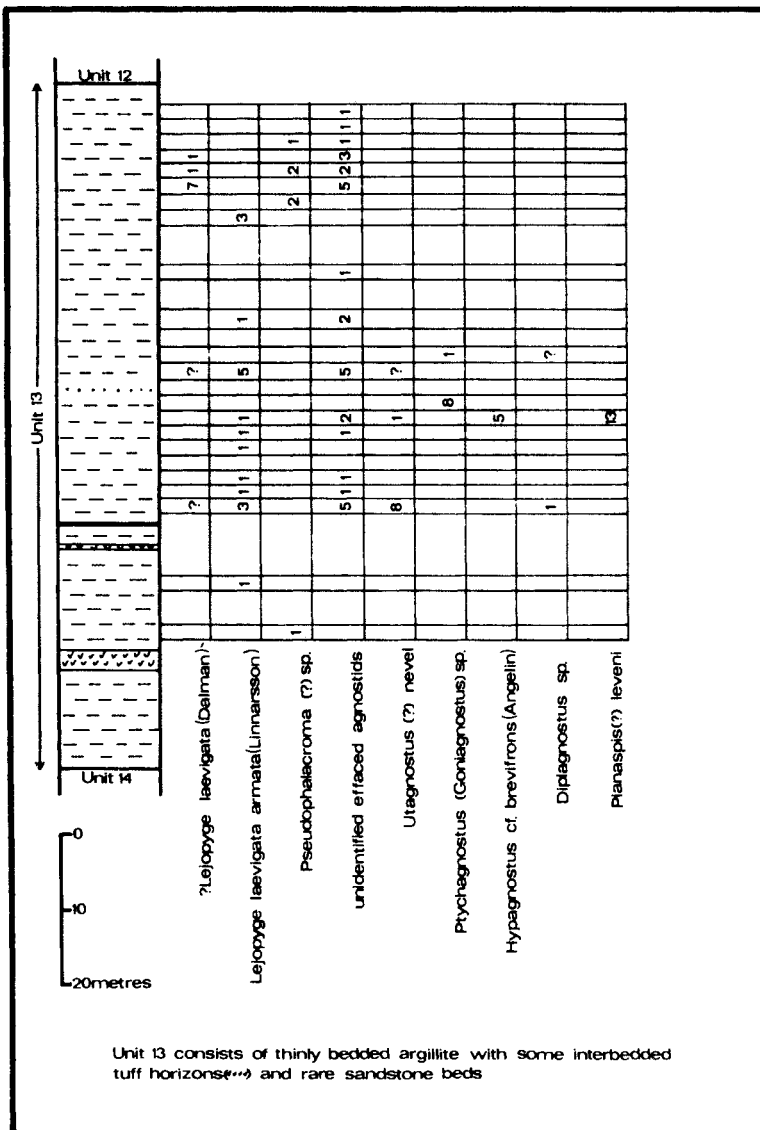


FIG. 3 - Stratigraphic distribution of trilobite species in unit 13 of Sugarloaf Gorge road section of Burns (1964). All specimens collected by the writer from this unit are tabulated. The unidentified effaced agnostids probably belong in ?*Lejopyge laevigata*, *L. laevigata armata* and *Pseudophalacroma*(?) sp.

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Stratigraphically above the fauna with *Lejopyge*, Banks (1956, p.185) found trilobites within a highly folded sequence exposed along an old timber track on the west side of Sugarloaf Gorge (fig. 2). Four poorly fossiliferous horizons are known near lat. 41°15.4'S, long. 146°04.2'E. The lowest exposed bed of this sequence, a siltstone, contains inarticulate brachiopods plus the trilobites *Nepea* sp., *Aspidagnostus* sp., *Valenagnostus* sp., *Clavagnostus* sp. (described and figured in Jago and Daily 1974) and a possible *Peronopsis* (too poorly preserved to describe or figure). *Agnostascus* sp., *Nepea* and other trilobites occur slightly higher in the section (fig. 2). This fauna is very similar to the main fauna from St. Valentines Peak which has an age of either *Lejopyge laevigata* III Zone or *Damesella torosa-Ascionepea janitrix* Zone (Jago 1973).

## PALAEONTOLOGY

In common with other Tasmanian Cambrian fossils the trilobites described below have undergone tectonic distortion. Henningsmoen (1960, p.207) noted that there are three main types of symmetrical distortion with respect to the orientation of bilaterally symmetrical fossils such as trilobites: (a) a dorso-ventral flattening, (b) where the length is enlarged with respect to the width, L form and (c) where the width is enlarged with respect to the length, W form. Those fossils in which the distortion has been asymmetrical are stated here to have undergone intermediate distortion (i.e., the compression took place at an oblique angle to the length of the trilobite). In cases where no comment is made about the type of distortion, it is because little distortion has taken place. Unless otherwise stated, all length measurements noted in this paper were taken along the axis of the trilobites; all width measurements were taken parallel to the anterior end of the pygidium, or parallel to the posterior end of the cephalon.

All specimens described here are preserved as external or internal moulds. Where possible silicone rubber casts of the external moulds were prepared. All figured specimens were photographed after being whitened with magnesium oxide. All catalogue numbers refer to the collections of the Geology Department, University of Tasmania.

This paper completes the descriptions of all known trilobites from the road cutting on the main road to Gunns Plains. The polymerid trilobites from the old timber track will be described in conjunction with those from St. Valentines Peak. The taxonomic terminology used in this paper is after Öpik (1961a, 1963, 1967). The agnostid trilobite classification of Öpik (1967) is followed here.

## SYSTEMATIC DESCRIPTIONS

Order Miomera Jaekel, 1909  
 Suborder Agnostina Salter, 1864  
 Superfamily Agnostacea M'Coy, 1849  
 Family Agnostidae M'Coy, 1849  
 Subfamily Quadragnostinae Howell, 1935

Genus *HYPAGNOSTUS* Jaekel, 1909

Synonymy: See Jago 1976

Type Species: *Agnostus parvifrons* Linnarsson 1869, p. 82, pl. 2, figs. 56, 57.

Diagnosis: See Robison 1964, p. 529.

*Hypagnostus* cf. *brevifrons* (Angelin)  
 pl. 1, figs. 1-4

Synonymy: See Jago 1976

Material: Two small, very poorly preserved complete specimens are available as well as two cephalata and two pygidia of moderate preservation.

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Measurements: UT 92492, cephalon, W form, length, about 2.0 mm, width, 2.5 mm:  
UT 92493, pygidium, L form, length, 1.9mm.

Comments: This form is indistinguishable from the form described by Jago (1976) as *Hypagnostus* cf. *brevifrons* (Angelin) from the upper fauna at Christmas Hills.

Occurrence: *Hypagnostus* cf. *brevifrons* (Angelin) comes from unit 13, lower sedimentary sequence of Radfords Creek Group, Gunns Plains Road, lat. 41°16.1'S, long. 146°03.7'E.

Genus *VALENAGNOSTUS* Jago, 1976

*Valenagnostus* Jago, 1976.

Type Species: *Agnostus nudus* Beyrich var. *marginata* Brögger, 1878, p. 73, pl. 6, fig.3.

Diagnosis: See Jago 1976.

*Valenagnostus* sp.  
pl. 1, fig. 5

One poorly preserved internal mould of a pygidium (UT 92498) of *Valenagnostus* is known from the lowest fauna on the timber track on the west side of the Sugarloaf Gorge. It has a very prominent terminal axial node, and it may belong to *Valenagnostus banksi*. However, no firm determination can be made.

Genus *PSEUDOPHALACROMA* Pokrovskaya, 1958

*Pseudophalacroma* Pokrovskaya 1958, p. 79, <sup>"</sup>Opik 1961b, p. 90; Chu, 1965, p. 139.

Type Species: *Pseudophalacroma crebra* Pokrovskaya 1958, p. 79, pl. 3, figs. 4-6.

Diagnosis: See Opik 1961b, p. 90.

*Pseudophalacroma*(?) sp.  
pl. 1, figs. 6-8

Material: Several complete specimens in a poorly to moderately preserved condition are available. Several individual cephalons and pygidia in a similar state of preservation are known. The following description is based mainly on specimens UT 92500 (the best preserved external mould pl. 1, fig. 8) and UT 92501 (the best preserved internal mould pl. 1, fig. 7).

Measurements: UT 92500, L form, total length, 5.3mm; cephalon, length, 2.7mm, width, 2.2mm; pygidium, length, 2.4mm (without articulating half ring), width, 2.0mm:

UT 92501, internal mould, L form, total length, 6.3mm; cephalon, length, 2.7mm, width 2.3mm; pygidium, length (without articulating half-ring), 2.5mm, width, 2.4mm.

Description: The strongly convex cephalon is probably about as wide as long. The border is narrow. The narrow rim is difficult to see due to the very steep sides of the acrolobe; the rim appears to be a continuation of the acrolobe with the outline of the cephalon being interrupted by the narrow, shallow marginal furrow. There are short posterolateral spines. The cephalon is almost entirely effaced with only the posterior end of the glabella being outlined. The cephalon has a steep posterior end. The basal lobes are small and simple with a very narrow connecting band between them which passes under the broadly rounded glabellar rear. The basal lobes are outlined by shallow furrows; the axial furrows do not extend past the anterior ends of the basal lobes. The rest of the cephalon appears to be smooth. The pygidium is probably about as long as is wide. It is considerably less convex than the cephalon and has a truncated anterior end. The wide border is composed of a wide, elevated strongly convex rim which narrows considerably to the anterior and a wide deep marginal furrow. At the posterior the border has a length (sag.) about 0.15 that of the pygidium. The shoulder furrows are moderately wide and deep; the convex shoulders are of moderate width; the fulcra occur just over half way from the anterolateral corners to the axial furrows. The axis is outlined only in its anterior region. It consists of at least two lobes, the more posterior of which is narrower (tr.) than the other. A small node is present on the second axial lobe; it is also the highest point on the axis but is not visible on the photographs of these specimens. At the anterior the

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axis has a width about 0.45 that of the pygidium. The axial furrows are shallow but distinct along the first axial lobe. They can be barely made out along most of the second axial lobe, to the posterior of which they vanish. The pleural fields appear to be smooth.

Discussion: This species is tentatively referred to *Pseudophalacroma* Pokrovskaya rather than *Valenagnostus* because (1) the glabellar rear and posterior portions of the basal lobes are better outlined than in *Valenagnostus*, (2) the pygidial border is somewhat narrower than that of *Valenagnostus*, (3) there is no terminal pygidial axial node. *Pseudophalacroma*(?) sp. described above may be related to *Pseudophalacroma* sp.K of Öpik (1961b, p. 94, pl. 22, fig. 12).

Occurrence: *Pseudophalacroma*(?) sp. comes from unit 13 of the lower sedimentary sequence of the Radfords Creek Group as exposed along the Gunns Plains Road.

Subfamily Ptychagnostinae Kobayashi, 1939.  
Genus *PTYCHAGNOSTUS* Jaekel, 1909

Synonymy: See Robison 1964, and Jago 1976.

Type Species: *Aagnostus punctuosus* Angelin, 1851, p. 8, pl. 6, fig. 11.

Diagnosis: See Robison 1964, p. 522

*Ptychagnostus (Goniagnostus)* sp.  
pl. 1, figs. 9-15

Material: Several poorly to moderately well-preserved cephalons and one poorly preserved complete specimen, UT 92519, are available. No well-preserved, complete pygidium is available. However, specimen UT 92520 has a fairly well-preserved, incomplete pygidium. The description of the pygidium is based mainly on this specimen. All specimens except one cephalon (UT 92521) and one poorly preserved pygidium (UT 92522, not figured) are internal moulds.

Measurements: UT 92520, length of glabella, 3.0mm; UT 92523, cephalon, length of acrolobe, 2.3mm, width of acrolobe, 2.3mm; UT 92524, cephalon, length, 4.0mm; UT 92525, small complete specimen; cephalon, length, 1.9mm, width, 2.0mm; pygidium, length, 1.7mm, width, 1.7mm; UT 92526, cephalon, length, 3.1mm, width, 3.3mm; UT 92521, cephalon, length of acrolobe, 2.5mm, width of acrolobe, 2.3mm; UT 92519, pygidium, length, 2.0mm, width, 2.1mm.

Description: The cephalon is about as wide as long. The border is composed of a narrow, shallow marginal furrow and a narrow, upraised rim. The cheeks are highly scrobiculate. There is a wide, moderately deep preglabellar median furrow. The glabella is outlined by deep, moderately wide axial furrows; it has a length approximately 0.7-0.8 that of the cephalon (the nature of the specimens does not allow a more accurate determination). There is a wide, moderately deep transverse glabellar furrow. The anterior glabellar lobe is subtriangular with a broadly rounded anterior end; it has a length approximately 0.4 that of the glabella. At the transverse glabellar furrow the glabella has a width approximately 0.3 that of the acrolobe. The posterior glabellar lobe is trilobed (including the basal lobes) with two evenly spaced pairs of lateral glabellar furrows. Each of the anterior pair of lateral furrows extends across about one-third of the glabella from the axial furrows. The anterior lateral furrows are wide and deep. The posterior pair of lateral furrows are more a pair of moderately deep pits rather than furrows. To the posterior of these pits are the small, subquadrate basal lobes which are outlined on the adaxial margins by moderately deep and wide furrows which extend parallel to the axis of the glabella. The central one-third of the posterior glabellar lobe consists of a rounded ridge which extends all the way along the lobe increasing in height posteriorly.

As indicated above, the only good pygidial detail is seen in UT 92520, pl. 1, fig. 9, which is an incomplete, fairly well-preserved specimen. It occurs as two closely associated fragments which were probably originally separated by a scavenger (Jago 1974a).

## PLATE 1

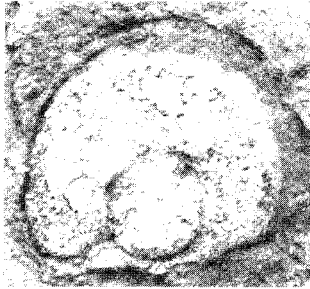
- Figs. 1-4            *Hypagnostus* cf. *brevifrons* (Angelin). 1, UT 92492, cephalon, W form, x12.8. 2, UT 92494, cephalon, intermediate distortion, x14.2. 3, UT 92493, pygidium, L form, x20. 4, UT 92495, pygidium, x10.5.
- Fig. 5              *Valenagnostus* sp. UT 92498, internal mould of partial pygidium, W form, x8.5.
- Figs. 6-8           *Pseudophalacroma*(?) sp. 6, UT 92502, internal mould of cephalon, x8.3. 7, UT 92501, internal mould of complete specimen, L form, x7. 8. UT 92500, complete specimen, L form, x13.
- Figs. 9-15          *Ptychagnostus* (*Goniagnostus*) sp. 9, UT 92520, internal mould of partially complete specimen with broken pygidium, x5. 10, UT 92523, internal mould of cephalon, x12.2. 11, UT 92521, external mould of cephalon figured in Fig. 10, x10.4. 12, UT 92524, internal mould of cephalon, x7. 13, UT 92525, internal mould of poorly preserved complete specimen, x9.5. 14, UT 92524, internal mould of cephalon, x8. 15, UT 92519, very poorly preserved pygidium, thorax and cephalic posterior, x14.5.

All specimens except that illustrated in Fig 5 come from Unit 13 of lower sedimentary sequence of Radfords Creek Group as exposed along main road to Gunns Plains. Fig. 5 comes from the timber track on west side of Sugarloaf Gorge, lower sedimentary sequence of Radfords Creek Group.

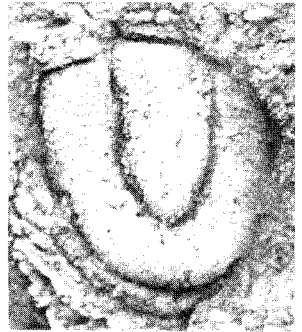




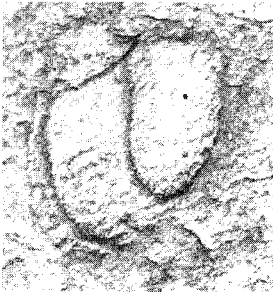
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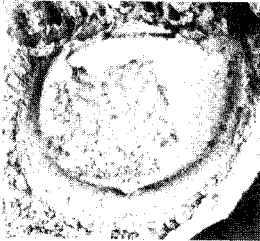
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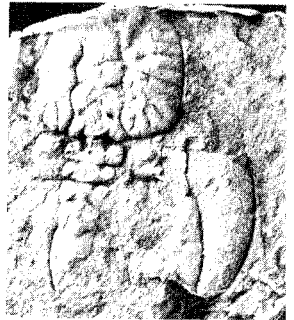
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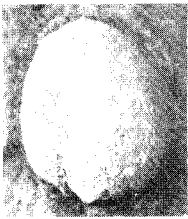
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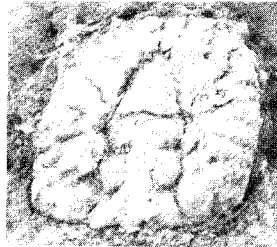
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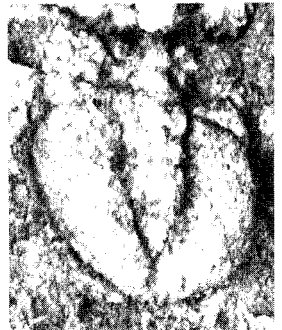
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14



15

## PLATE 2

- Figs. 1-2            *?Lejopyge laevigata* (Dalman). 1, UT 92527, internal mould of complete specimen, L form, x8.2. 2, UT 92528, pygidium, intermediate distortion, x9.
- Figs. 3-8            *Lejopyge laevigata armata* (Linnarsson). 3, UT 92529, cephalon and two thoracic segments, x6.7; 4, UT 92530, cephalon, x8.5; 5, UT 92532, pygidium, x8.8; 6, UT 92531, pygidium, x12.9; 7, UT 92533, posterior thoracic segment, x10.4; 8, UT 92534, pygidium (with an ?echinoderm plate), x8.2.
- Figs. 9-12          *Utagnostus(?) nevel* sp. nov. 9, UT 92607, cephalon and pygidium from same original animal, intermediate distortion, x20; 10, UT 92810, pygidium, intermediate distortion, x18.6; 11, UT 92605, holotype cephalon, W form, x24; 12, UT 92606, cephalon, intermediate distortion, x18.6.
- Fig. 13             *Diplagnostus* sp. UT 92621, cephalon, x18.5.

All specimens figured in Figs. 1-13 come from unit 13 of the lower sedimentary sequence of the Radfords Creek Group as exposed on the main road to Gunns Plains, Sugarloaf Gorge.

- Fig. 14             *Aspidagnostus* sp. UT 92498, cephalon, W form, x16.
- Figs. 15-17         *Agnostascus* sp. Figs. 15 and 16, UT 92631, poorly preserved cephalon, 15, external mould, x5.8; 16, internal mould, x6.2. 17, UT 24542, pygidium, x7.3.

The specimens figured in Figs. 14-17 come from the lower sedimentary sequence of the Radfords Creek Group, old timber track, west side of Sugarloaf Gorge.

- Fig. 18             *Tasagnostus* sp., UT 92625, partially complete specimen, x5.4; locality, unit 15 of lower sedimentary sequence of Radfords Creek Group as exposed on the main road to Gunns Plains, Sugarloaf Gorge.

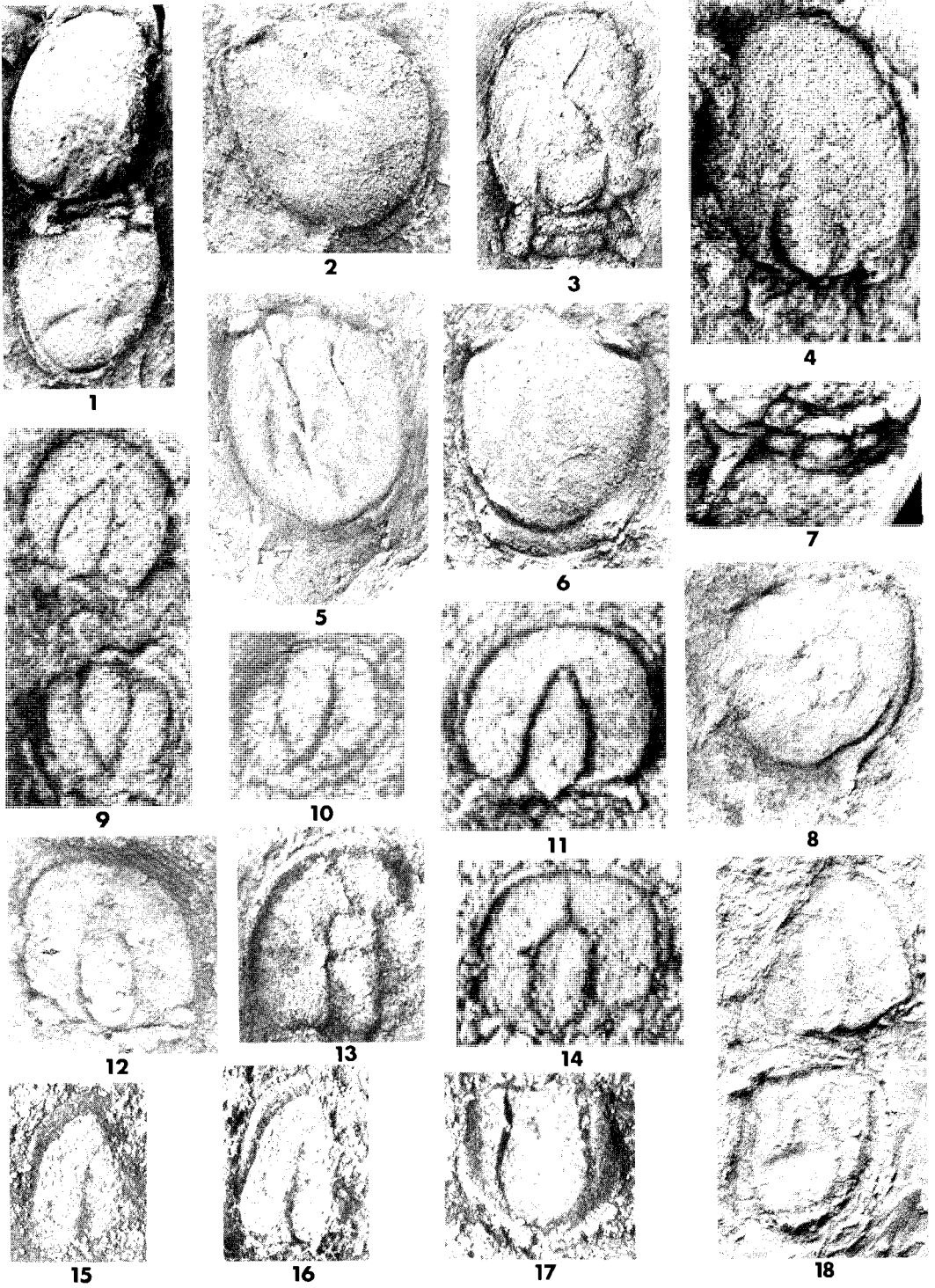


PLATE 2

The border is composed of a narrow, shallow marginal furrow and a narrow, flat, elevated rim. The rim widens appreciably to two flat, short border spines. Anterior to the spines the pygidial margin is almost straight; the posterior margin of the pygidium between the spines is probably evenly curved. The shoulder furrows are narrow and shallow. The shoulders are not preserved well but appear to be reasonably wide. The articulating device is not visible. The pleural regions are smooth. There is a well developed post-axial median furrow. The pygidial axle is outlined by narrow, moderately deep furrows. Although the axle is never clearly preserved as a single unit, it appears to be quadrilobed and this species thus belongs in *Ptychagnostus* (*Goniagnostus*). The length of the axis appears to be about 0.75 that of the pygidium. The two anterior lobes are short (sag.) and are outlined by distinct, narrow, shallow lateral furrows, the anterior pair of which run inwards and forwards from the axial furrows; the posterior pair of lateral furrows run inwards and backwards and meet around the posterior end of the prominent rounded ridge; this ridge extends along the centre of the two anterior axial lobes and may extend just over on to the third lobe. The ridge is just under one-third of the width of the axis.

Discussion: The Sugarloaf Gorge specimens of *Ptychagnostus* (*Goniagnostus*) are not well enough preserved to place in any particular species although they clearly belong to a single species of *Ptychagnostus* (*Goniagnostus*). Thus, they are referred to *Ptychagnostus* (*Goniagnostus*) sp.

Occurrence: *Ptychagnostus* (*Goniagnostus*) sp. comes from unit 13 of the lower sedimentary sequence of the Radfords Creek Group as exposed along the Gunns Plains Road.

#### Genus *LEJOPYGE* Hawle and Corda, 1847

Synonymy: See Daily and Jago 1975

Type Species: *Battus laevigatus* Dalman 1828, p. 136.

Discussion: The taxonomic and biostratigraphic significance of the species and sub-species of *Lejopyge* have been discussed at length by Daily and Jago (1975).

Opik (1961b, p. 94) differentiates between the cephalae of *Pseudophalacroma dubium* and *Lejopyge* as follows:

- (a) *dubium* has a more salient front than *Lejopyge*,
- (b) *dubium* has considerably shorter residual dorsal furrows,
- (c) the furrows around the basal lobes are much more effaced in *dubium* than in *Lejopyge*.

However, although (a) is valid, points (b) and (c) seem to be no longer valid with respect to the later published species *Lejopyge calva* Robison (1964, p. 521, pl. 83, figs. 1-4). In distorted specimens such as those from Sugarloaf Gorge, it is difficult to differentiate between *Pseudophalacroma* and *Lejopyge* on the basis of cephalic differences. However, the pygidia are distinct; the pygidial border of *Pseudophalacroma* is decidedly wider than that of *Lejopyge*; the marginal furrow of *Pseudophalacroma* is also deeper and more distinctly outlined; marginal spines are never present on *Pseudophalacroma*.

#### (?) *Lejopyge laevigata* (Dalman) pl. 2, figs. 1, 2

Synonymy: See Palmer 1968, p. 28.

Material: About twelve specimens from the Sugarloaf Gorge section are provisionally assigned to *Lejopyge laevigata* (Dalman).

Measurements: UT 92527, complete internal mould, L form, total length, 6.8mm; cephalon, length, 3.5mm, width, 2.7mm; pygidium, length, 3.1mm, width, 2.8mm: UT 92528, pygidium, L form, length, 4.0mm, width, about 3.6mm.

Discussion: The usually poor preservation of fossils in the Sugarloaf Gorge section makes the differentiation of effaced agnostids difficult. *Lejopyge laevigata armata* (Linnarsson) is easily differentiated by means of its long spines. However, there appear to be two other groups of effaced agnostids present in the Sugarloaf Gorge section--one of which is probably *Lejopyge laevigata* (Dalman) and the other may be a species of *Pseudophalacroma* Pokrovskaya. As observed by Opik (1961b, p. 94) when

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discussing *Pseudophalacroma dubium* from Queensland, the cephalo of *P. dubium* and *Lejopyge* are similar. The same would apply to other species of *Pseudophalacroma*. As noted above, two of Öpik's criteria for differentiating between the cephalo of *dubium* and *Lejopyge* are invalid, and the third one (i.e., that *dubium* has a more salient front than *Lejopyge*) cannot be used in the Sugarloaf Gorge material.

The pygidia of (?)*Lejopyge laevigata* and the *Pseudophalacroma*(?) sp. from the Sugarloaf Gorge show about equal effacement. The differences are (a) the rim of *Pseudophalacroma*(?) sp. is wider than that of (?)*Lejopyge laevigata*, (b) the posterior of the acrolobe of *Pseudophalacroma*(?) sp. is sharper than that in (?)*Lejopyge laevigata*, and (c) the acrolobe in *Pseudophalacroma*(?) sp. has a "subtriangular" appearance. It should be noted that (?)*Lejopyge laevigata* from the Sugarloaf Gorge appears to be more effaced than the Swedish or Queensland examples of *L. laevigata*; it may be that the Sugarloaf Gorge form does not belong with *laevigata*.

Banks (1956, p. 185) refers to a record of Öpik (1951) in which Öpik records the occurrence of *Lejopyge laevigata* and *L. laevigata armata* from the same Sugarloaf Gorge location as the forms noted here as (?)*Lejopyge laevigata*, *Pseudophalacroma*(?) sp. and *L. laevigata armata*. The forms reported by Öpik as *L. laevigata* probably include both (?)*Lejopyge laevigata* and *Pseudophalacroma*(?) sp. as described here.

Occurrence: (?)*Lejopyge laevigata* (Dalman) comes from unit 13 of the lower sedimentary sequence of the Radfords Creek Group as exposed along the Gunns Plains Road.

*Lejopyge laevigata armata* (Linnarsson)

pl. 2, figs. 3-8

*Agnostus laevigatus* var. *armata* Linnarsson 1869, p. 82, pl. 2, figs. 58, 59.

*Lejopyge laevigata armata* (Linnarsson) Westergård 1946, p. 89, pl. 13, figs. 28-36;

Öpik 1961b, p. 87, pl. 21, figs. 10a, b; pl. 22, figs. 1-4.

*Lejopyge cos* Öpik 1967, p. 93, pl. 57, figs. 5, 6; text fig. 20.

Material: About twenty specimens collected by the author were studied.

Measurements: UT 92529, cephalon, length, 4.5mm; UT 92530, cephalon, length, 4.7mm; UT 92531, pygidium, length, 2.8mm; width, 2.7mm; UT 92532, pygidium, length, 4.3mm, width, 3.8mm.

Discussion: There appears to be no essential difference between the Sugarloaf Gorge forms and the Swedish forms of *L. laevigata armata* figured by Westergård (1946, pl. 13, figs. 28-36). *L. laevigata armata* has been previously recorded from the Sugarloaf Gorge by Öpik (1951), Banks (1956, 1962) and Jago (1973, 1974b).

Occurrence: *Lejopyge laevigata armata* (Linnarsson) comes from unit 13 of the lower sedimentary sequence of the Radfords Creek Group as exposed along the Gunns Plains Road.

Family Clavagnostidae Howell, 1937

Subfamily Aspidagnostinae Pokrovskaya, 1960

Genus *ASPIDAGNOSTUS* Whitehouse, 1936

Synonymy: See Jago 1976.

Type Species: *Aspidagnostus parmatus* Whitehouse 1936, p. 105, pl. 9, fig. 5 only.

Diagnosis: See Öpik 1967, p. 116 and comment by Jago (1976).

*Aspidagnostus* sp.

pl. 2, fig. 14

One poorly preserved partial cephalon, UT 92498, is known. It has a similar appearance to the cephalon of *Aspidagnostus* sp. from St. Valentines Peak (Jago 1976), but without better preservation no firm assignation can be made. It is referred to *Aspidagnostus* sp.

Occurrence: *Aspidagnostus* sp. comes from the lowest fauna exposed along the old timber track on the west side of Sugarloaf Gorge, lat. 41°15.4'S, long. 146°04.2'E.

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Family Diplagnostidae Whitehouse, 1936  
 Subfamily Diplagnostinae Whitehouse, 1936  
 Genus *DIPLAGNOSTUS* Jaekel, 1909

Synonymy: See Jago 1976

Type Species: *Agnostus planicauda* Tullberg, 1880 (*non* Angelin, 1851).

Diagnosis: See Opik 1961b, p. 69

*Diplagnostus* sp.  
 pl. 2, fig. 13

Material: Only one poorly preserved cephalon UT 92621 is available for study. Both the internal and external moulds are present although only about half the external mould is preserved.

Measurements: On external mould, exposed length, 1.9mm; on internal mould, length, 1.9mm; width, 1.9mm.

Description: The strongly convex cephalon is about as wide as long. The border is composed of a wide, shallow marginal furrow and a moderately wide, elevated rim. The border narrows to the posterior. The area in front of the glabella is not clearly preserved, but there appears to be a faint preglabellar median furrow at least in the region immediately in front of the glabella. The cheeks seem to be slightly scrobiculate. The basal lobes are small and simple. The glabella is outlined by moderately wide and deep, almost parallel furrows. Just to the posterior of the transverse glabellar furrow, the glabella widens slightly.

The transverse glabellar furrow is not very clearly preserved, but it appears to be shallow, moderately wide, and arched slightly forward. The anterior glabellar lobe is almost square. There is a small median sulcus at the front of the anterior glabellar lobe. At the transverse glabellar furrow the glabella is just under 0.3 the width of the cephalon. The glabellar length is about 0.65 that of the cephalon. The anterior glabellar lobe has a length about 0.3 that of the glabella. No details of the posterior glabellar lobe are visible although the glabellar rear is subangular (seen on internal mould).

Discussion: There is only one cephalon of *Diplagnostus* from Sugarloaf Gorge. This specimen does not allow a detailed comparison with described species of *Diplagnostus*. It is referred to here as *Diplagnostus* sp.

Occurrence: *Diplagnostus* sp. comes from unit 13 of the lower sedimentary sequence of the Radfords Creek Group as exposed along the Gunns Plains Road.

Subfamily Oidagnostinae Opik, 1967  
 Genus *TASAGNOSTUS* Jago, 1976

*Tasagnostus* Jago, 1976

Type Species: *Tasagnostus debori* Jago, 1976

Diagnosis: See Jago 1976

*Tasagnostus* sp.  
 pl. 2, fig. 18

A single specimen UT 92625 comprising a poorly preserved almost complete agnostid is known from the upper part of unit 15 along the road to Gunns Plains. The wide borders, the elongated node on the anterior of the posterior glabellar lobe, the zonate pygidium and the postero-centrally placed transverse pygidial axial furrow indicate that this specimen belongs in *Tasagnostus*.

It differs from both *T. debori* and *T. compari* in that the posterior pygidial axial lobe is more expanded than in either of these species. Consequently, the width of the posterior part of the pleural areas is much smaller than in either *debori* or *compari*. However, the specimen is not well enough preserved to allow the erection of a new species, and it is termed *Tasagnostus* sp.

Occurrence: *Tasagnostus* sp. comes from unit 15 of the lower sedimentary sequence of

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the Radfords Creek Group as exposed along the Gunns Plains Road.

Subfamily Unknown  
Genus *UTAGNOSTUS* Robison 1964

*Utagnostus* Robison 1964, p. 532, Jago 1976.

Type Species: *Utagnostus trispinulus* Robison 1964, p. 533, pl. 82, figs. 21-28.

Diagnosis: See Robison 1964, p. 532.

*Utagnostus(?) nevel* sp. nov.  
pl. 2, figs. 9-12

Material: Two moderately well-preserved cephalons (UT 92605, UT 92606), one poorly preserved specimen (UT 92607) which has an associated cephalon and pygidium from the one animal, two poorly preserved cephalons (UT 92608, UT 92609) and a poorly preserved pygidium (UT 92610) are available for description.

Selection of Holotype: The best preserved cephalon, UT 92605 (pl. 16, fig. 7) is selected as the holotype.

Diagnosis: The cephalon of this small agnostid has a narrow border with a moderately wide, flat rim and long posterolateral spines. There is no preglabellar median furrow. The basal lobes are small and simple. A vestigial bilobation of the apparently monolobed glabella is outlined by a distinct narrowing of the glabella towards the anterior. The pygidium has a narrow border with two short border spines. The posterior border extends slightly forward at its centre to meet the narrow pointed axis.

Measurements: UT 92605, cephalon, W form, length, 1.2mm, width, 1.3mm; UT 92607, cephalon, intermediate distortion, length, 1.1mm, width about 1.1mm; pygidium, length, 1.1mm, width, 1.0mm.

Description: The small, moderately convex cephalon is about as wide as long. There is a narrow, shallow, marginal furrow and a moderately wide, flat rim. A pair of thick, moderately long posterolateral spines arise from wide bases. The cheeks appear to be smooth. There is no preglabellar furrow. The glabella is outlined by moderately wide and deep furrows; it has a length about two-thirds that of the cephalon. Between the tips of the short, small, simple basal lobes and about the midpoint of the glabella, the glabella has parallel sides. A vestigial bilobation of the apparently monolobed glabella is outlined by a sharp narrowing of the glabella towards the anterior. At the same point the glabella on some specimens appears to have a faint transverse glabellar furrow, but this is probably due to the effects of distortion. No other glabellar details can be seen except that the glabellar rear is angular.

No pygidium is very well or completely preserved. The markedly convex pygidium is about as wide as long. The marginal furrow is narrow and shallow. There are two short border spines between which the posterior rim is wider than the narrow lateral rims. The posterior border extends slightly forward at its centre to meet the narrow pointed axis, which is outlined by moderately wide and deep furrows. The axis has a length about 0.8 that of the pygidium. The pleural fields are smooth. No axial details can be clearly seen. The articulating device is never well preserved, but the articulating furrow has a deep pit at either end.

Discussion: This species was referred to in Jago (1973, p. 409) as cf. *Clavagnostus* sp. It is here questionably included in *Utagnostus*. It is similar to *U. neglecta* in that it has an apparently monolobed glabella and large cephalic spines. However, the pygidial axis of *nevel* is shorter and narrower than in any known species of *Utagnostus*. The pygidium of *Utagnostus* is trispinose, but the preservation of *nevel* is too poor to determine if its pygidium is trispinose. *Utagnostus(?) nevel* differs from *U. neglecta* in that it has an angular glabellar rear and shorter pygidial spines. The pygidial axis of *U(?) nevel* is narrower and is more pointed than that of *U. neglecta*.

The cephalon of *U(?) nevel* is similar to that of *U. trispinulus* Robison (1964, pl. 82, figs. 21-24) except that the glabella of *U. trispinulus* has a distinct transverse

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glabellar furrow. However, the pygidium of *trispinulus* has a wide, somewhat expanded, axis and a trispinose margin.

Occurrence: *Utagnostus(?) nevel* sp. nov. comes from unit 13 of the lower sedimentary sequence of the Radfords Creek Group as exposed along the Gunns Plains Road.

Genus *AGNOSTASCUS* Öpik, 1967

*Agnostascus* Öpik, 1967, p. 147.

Type Species: *Agnostascus gravis* Öpik, 1967, p. 147, pl. 61, figs. 1-4, text fig. 38.

Diagnosis: See Öpik 1967, p. 147.

*Agnostascus* sp.

pl. 2, figs. 15-17

Material: One poorly preserved, partial cephalon (UT 92631) and one poorly preserved pygidium (UT 24542) are available. The pygidium has a length of 3.3mm (excluding the articulating half-ring) and a width of 3.3mm.

Description: The cephalon has a constricted acrolobe. At the anterior the rim is narrow and elevated and the marginal furrow is of moderate width. Both narrow to the posterior. There is a shallow transverse glabellar furrow. The anterior glabellar lobe has a length about 0.3 that of the glabella. There is probably a preglabellar median furrow. There is a node placed well forward on the posterior glabellar lobe. The basal lobes are small. No other glabellar details can be seen.

The border details of the strongly convex pygidium are not entirely clear. There is a narrow to moderately wide marginal furrow and a narrow rim. The preservation is such that border spines, if present, cannot be seen. The acrolobe is constricted. The wide trilobed axis has a broadly rounded rear and extends the full length of the acrolobe. The posterior lobe is slightly expanded. The axis is slightly constricted at the second axial lobe. There are no transverse axial furrows; the axial furrows are narrow and deep. There is a low, elongated node on the second lobe.

Discussion: The preservation of *Agnostascus* sp. is too poor to assign it to either an existing species or to a new species. However, it is quite similar to *A. gravis* Öpik as far as can be seen. The pygidial axis of the Tasmanian form is a little wider than that of *A. gravis*.

Occurrence: *Agnostascus* sp. is known from the lower sedimentary succession of the Radfords Creek Group as exposed on an old timber track along the west side of Sugarloaf Gorge.

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