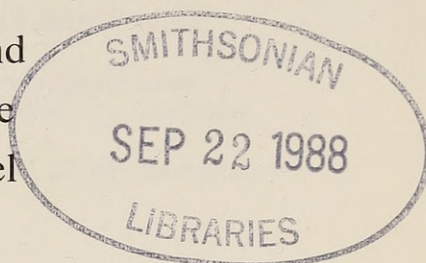


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A REDESCRIPTION OF *AFROCHILTONIA*  
*CAPENSIS* (K. H. BARNARD, 1916) WITH A  
REVIEW OF THE GENERA OF THE FAMILY  
CEINIDAE (CRUSTACEA, AMPHIPODA)

By

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Cape Town

Kaapstad

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(K. H. BARNARD, 1916)  
WITH A REVIEW OF THE GENERA OF THE FAMILY CEINIDAE  
(CRUSTACEA, AMPHIPODA)

By

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(With 4 figures)

[MS accepted 2 February 1988]

ABSTRACT

*Afrochiltonia capensis* (Barnard, 1916) is redescribed and figured, including the first description of the male, and a lectotype is selected. In the light of this redescription it is concluded that *A. capensis* is sufficiently different from currently recognized Australian congeners to warrant generic recognition. The genera of Ceinidae are reviewed briefly and *Austrochiltonia* Hurley, 1959, is resurrected for the Australian species with *Afrochiltonia* K. H. Barnard, 1955, being restricted to *A. capensis* from South Africa. A key to the genera of Ceinidae is provided.

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INTRODUCTION

*Afrochiltonia capensis* (Barnard, 1916) has never been adequately figured. The male was not correctly recognized until Griffiths (1976*b*) and has never been described, although R  he (1914), referring to six young females (as *Chiltonia subtenuis*), illustrated the second gnathopod of what is clearly a male.

Earlier confusion of non-ovigerous females with males led to a misleading generic diagnosis, which has never been resolved satisfactorily. Barnard (1916) suggested widening the diagnosis of *Chiltonia* to accommodate what he thought was a species with gnathopod one and two alike in both sexes. Later Hurley (1954) noted an unusual modification of the first pleopod in the male of New Zealand species of *Chiltonia*, where the inner ramus forms 1–3 dorsally directed whip-like lashes. This feature was thought to be of generic significance and led to



the erection of *Afrochiltonia* Barnard, 1955, for the South African species and *Austrochiltonia* Hurley, 1959, for the Australian species, with the New Zealand species remaining in *Chiltonia* Stebbing, 1899. Thus *Afrochiltonia* was distinguished from *Austrochiltonia* by the condition of the male second gnathopod. There the matter remained until Griffiths (1976b) discovered some males with the characteristically enlarged second gnathopod. He consequently synonymized *Afrochiltonia* with *Austrochiltonia* and furthermore *Afrochiltonia capensis* with *Austrochiltonia subtenuis*. However, *Afrochiltonia* has priority over *Austrochiltonia*, as noted and corrected by Barnard & Karaman (1982). Despite all of these systematic changes the South African species remained poorly known and the male was still not described or figured.

Barnard's (1916) description is considered inadequate by today's standards and is insufficient for comparisons with similar fauna in New Zealand and Australia. Because 'Chiltonias' are very common and widespread in the freshwaters of southern Australia, with several undescribed species, it is important to establish clearly the systematic status of the South African species.

It is the purpose of this paper to redescribe *Afrochiltonia capensis* (Barnard, 1916), including the first description of the male, and to clarify the status of the genera of Ceinidae, particularly *Afrochiltonia* and *Austrochiltonia*.

#### MATERIALS AND METHODS

Barnard's (1916) type specimens of *Afrochiltonia capensis* were borrowed from the South African Museum and examined in detail. As no other material of *A. capensis* was available from the South African Museum, additional specimens were collected at my request, from Milnerton Lagoon (see 'Material examined') by Dr C. L. Griffiths. These specimens are deposited in the South Australian Museum, except for the male described herein, which has been transferred to the South African Museum. Specimens of *Austrochiltonia* in the collections of the South Australian Museum were also examined for comparison.

Specimen length was measured along a lateral parabolic line drawn from the anterior extremity of the head through the middle of the body to the posterior limit of the telson. Barnard's type material was not used for size comparisons between males and females as his sample may have been biased towards larger specimens.

The thoracic limbs are referred to as gnathopod 1 and 2 followed by pereopods 3–7 to avoid confusion. Size comparisons of gnathopods exclude the coxa and dactyl and of the pereopods the coxa, with articles being measured down the middle.

Unless indicated otherwise dissected appendages were taken from the left hand side of the animal. The mouthparts of the lectotype and the mouthparts and appendages from the male, described herein, are mounted in poly-vinyl lactophenol on microscope slides. All other appendages, remains of dissected specimens, and other specimens are preserved in 75 per cent alcohol.



## SYSTEMATICS

Family **Ceinidae** J. L. Barnard, 1972*Afrochiltonia capensis* (Barnard, 1916)

Figs 1–4

*Chiltonia subtenuis* Rühe, 1914: 35, figs 13, 14a–c [non Sayce, 1902].*Chiltonia capensis* Barnard, 1916: 224, pl. 27 (figs 38–40).*Afrochiltonia capensis* Barnard, 1955: 93. Griffiths, 1974a: 253; 1974b: 327; 1975: 168; 1976a: 75, fig. 47.*Austrochiltonia subtenuis* Griffiths, 1976b: 30.*Type locality*

Salt River, Cape Town, South Africa, by present designation of lectotype.

*Material examined**Type material.* K. H. Barnard's syntypes consist of two lots.

SAM–A2885 labelled 'Type Specms' from Salt River, Cape Town, collected by Dr W. F. Purcell, October 1898, consisting of 8 females in alcohol, one of which has been selected as lectotype; the remainder have been designated paralectotypes and have been transferred to SAM–A39685.

SAM–A2886 from Milnerton near Cape Town, collected by K. H. Barnard, 25 October 1913, consisting of 20 females (some damaged) in alcohol and a microscope slide of the appendages of at least three specimens. All of this material has been designated paralectotypes. The slide material, although labelled 'Type', could not be used as the lectotype as it did not consist of a single specimen and the mountant had become crazed with age, thus obscuring the finer detail of the mounted appendages.

*Other material.* South Australian Museum No. C4165: 30 females and 6 males from Milnerton Lagoon, Cape Town, collected by C. L. Griffiths, 20 January 1987. SAM–A39686: male (the specimen described and illustrated herein), collection data as for C4165 but transferred to the South African Museum. South Australian Museum No. C4166: 40 females and 69 males from mouth of Milnerton Lagoon, near Cape Town, collected by C. L. Griffiths, June 1987.

*Description**Female*

Lectotype, 3.7 mm, non-ovigerous, SAM–A2885. Coxal gills present from G2 to P6. Oostegites, dorsally folded, present from G2 to P5.

Head as long as deep, length equivalent to first 1.5 pereonites; eyes black (in alcohol), ovato-circulate with some ommatidia diffuse dorsally.

Antenna 1 short, about twice head length or equivalent to 0.2 times body length; article 1 of peduncle almost twice as long as wide and 1.5 times length of article 2; article 3 slightly shorter than 2; flagellum slightly longer than peduncle, of six articles with a ventral aesthetasc at the base of each of the last two articles.



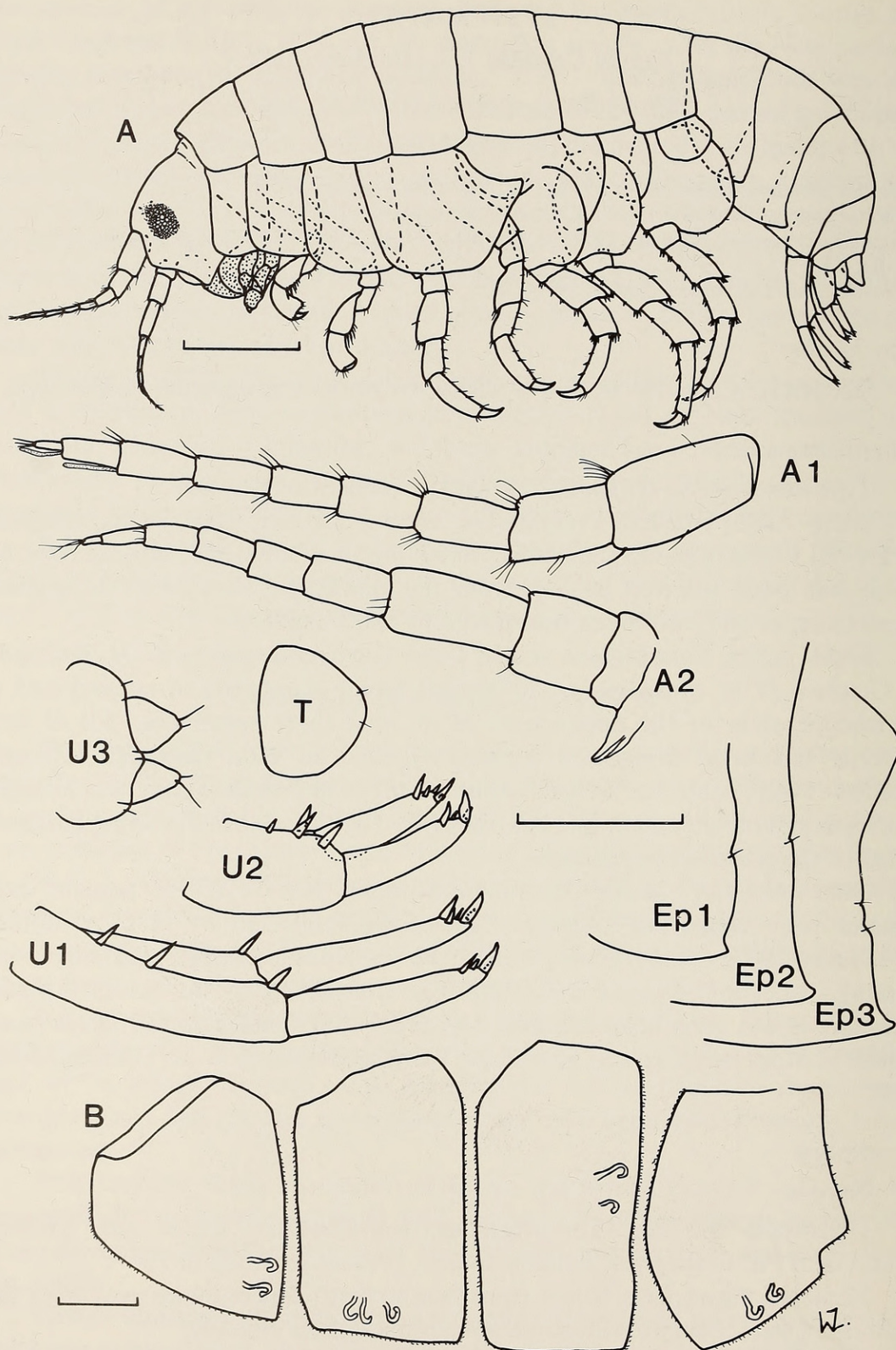


Fig. 1. *Afrochiltonia capensis* (Barnard). A. Lectotype female, 3,7 mm (SAM-A2885) (gills, oostegites and pleopods not shown). Scale bar = 0,5 mm. B. Oostegites from paralectotype specimen (SAM-A39685), shown in order from G2-P5. Scale bar = 0,2 mm. Other appendages from lectotype. Scale bar = 0,2 mm.



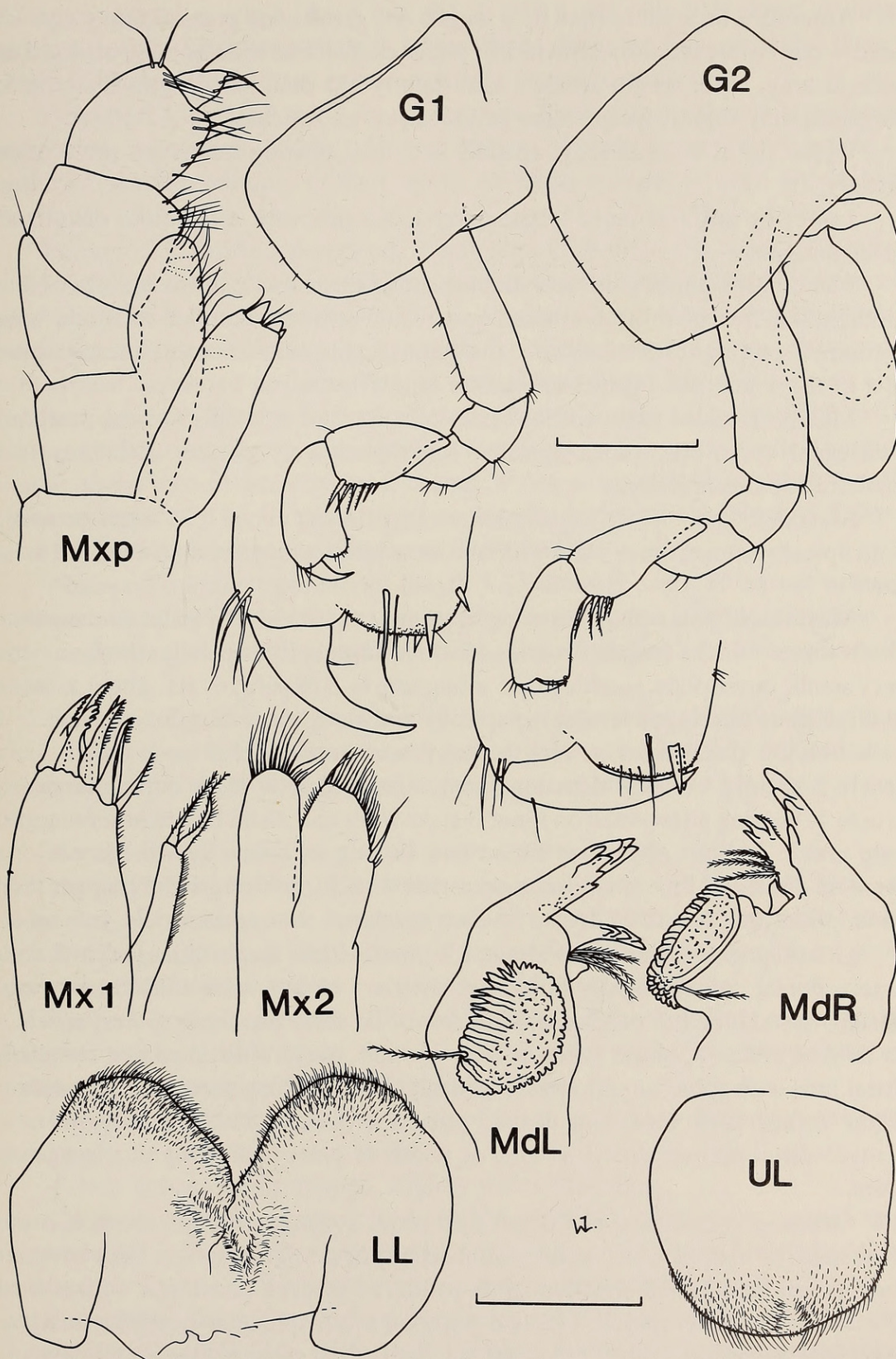


Fig. 2. *Afrochiltonia capensis* (Barnard). Lectotype female, 3,7 mm, gnathopods and mouthparts. Scale bars = 0,2 mm and 0,1 mm, respectively.



Antenna 2 little more than 0,75 length A1, gland cone pressed firmly against head—not visible laterally; article 1 of peduncle twice as wide as long; article 2 as wide as long, twice length article 1 and slightly less than half length of article 3; flagellum only slightly longer than peduncle, of six articles.

Upper lip as wide as long, apically rounded, bearing numerous short setae distally.

Lower lip without inner lobes; outer lobes subovate with setose distal and inner margins.

Mandibles without palp: left with incisor of seven teeth, lacina mobilis of five teeth, spine row of three feathered spines and triturative molar with one long feathered seta; right with incisor of five teeth, lacina mobilis of three teeth, spine row of three feathered spines and molar like left.

Maxilla 1: outer plate without palp but notched at palp's normal position, with eight comb-like spines apically; inner plate very narrow with only two feathered spines apically.

Maxilla 2: outer plate slightly longer than inner, about 0,75 times as wide; both apically setose; inner plate with one large seta on inner margin at end of setal row.

Maxilliped: inner plate reaching extremity of article 1 of palp, rectangular, about three times as long as broad, with three stout spines apically, the inner one very small; outer plate reaching 0,75 along article 2 of palp, ovate, about as wide as inner plate bearing several setae apically and along inner margin; palp article 1 with oblique distal margin, length outer margin about 2,5 times inner; palp article 2 slightly broader than long and slightly shorter than outer margin of article 1, bearing a few setae on inner distal corner and distal half of inner margin; palp article 3 about as long as broad and as long as article 2, with sparse long setae on distal and inner margins; palp article 4 small, conical, slightly longer than wide, about half length of article 3; dactylus sharp, as long as article 4.

Gnathopod 1: coxa length about 1,5 times width, longer than article 2 with antero-dorsal corner slightly produced; article 5 length twice maximum width, postero-distal lobe not produced, with row of six stout pectinate spines; article 6 as long as article 5, about twice as long as wide, postero-distal corner rounded, distal face with spine on either side of dactyl and two long medial setae, antero-distal corner with four long setae, posterior margin with small spine near postero-distal corner; dactyl as long as width of palm and fitting neatly against palm.

Gnathopod 2: similar to G1 but 1,25 times as long; coxal gill sac-like, more than twice as long as wide, as long as article 2; coxa slightly longer than wide, as long as article 2; article 5 with slightly produced postero-distal lobe with row of five stout pectinate spines; article 6 without small spine on posterior margin, otherwise as in G1.

Pereopod 3: length 1,35 times G2; coxal gill like that of G2; coxa like that of G2 but slightly larger, slightly longer than article 2; article 4 broad, about



0,7 times length; article 5 like 4 but not as broad and only 0,75 times as long; article 6 length 1,6 times article 5, about three times as long as wide; dactyl length 0,4 times article 6; all articles sparsely setose as illustrated.

Pereopod 4 identical to P3 except for coxa. Coxa with shallow antero-dorsal excavation, maximum width 1,5 times length, slightly longer than article 2, posterior margin oblique so that width at distal margin is only about half maximum width.

Pereopod 5: smallest pereopod, length about 0,9 times P4; coxal gill similar to P4 but a little wider; coxa width almost twice width article 2, length of anterior lobe about half maximum width coxa, length of posterior lobe about 0,7 maximum width coxa or as long as article 2; article 2 slightly longer than wide with typical expanded posterior margin and postero-distal lobe overlapping and almost reaching to distal margin of article 3; article 4 length 1,2 times width, with postero-distal corner produced; article 5 length about 1,2 times article 4 and of similar shape except postero-distal corner is not as produced; article 6 length 1,6 times article 5, about three times as long as wide; dactyl length 0,4 times article 6; all articles sparsely spinose as illustrated.

Pereopod 6 longest pereopod, length 1,25 times P5; like P5 except articles 3–6 somewhat longer in proportion to their width; coxa as wide as article 2, anterior lobe small, length about half width coxa, posterior lobe as long as coxa width.

Pereopod 7 a little shorter than P6; coxa semi-circular, slightly wider than long; article 2 as wide as long, postero-distal lobe extending beyond article 3, posterior margin slightly serrate and minutely spined with acute proximal corner; otherwise similar to P6.

Pleonal epimera with very small postero-ventral tooth.

Uropod 1 longer than U2; rami subequal, about 0,8 times as long as peduncle, outer ramus with two large and two small spines at tip, inner ramus with two large and three small spines at tip; peduncle with large spine on inner and outer-distal corner and two more on dorsal outer margin.

Uropod 2: rami subequal, a little more than 0,8 times as long as peduncle; peduncle and rami with spines as in U1 except outer ramus also has a spine on middle of inner margin (only on right in lectotype).

Uropod 3 one-articulate, half length of telson, conical in shape with one long outer and one short inner seta at tip.

Telson entire, hemispherical, slightly wider than long.

Oostegites from paralectotype (SAM-A39685), ovigerous, most eggs released. All with curled margins and numerous small hooks forming a tight marsupium. First is pentagonal with long distal and posterior margins, almost as wide as deep; second is rectangular, length 1,8 times width; third is also rectangular, length a little more than 1,8 times width and is longest oostegite, about 0,6 times length of P4; fourth is sub-rectangular with oblique distal margin and excavate postero-distal corner, maximum length 1,3 times maximum width.



*Male*

Hypotype 2,5 mm (SAM-A39686), generally like female but differs as follows.

Coxal gills relatively smaller.

Antenna 1 flagellum a little shorter than peduncle, consisting of only five articles.

Antenna 2 only slightly shorter than A1.

Mandibles: only right molar with long feathered seta.

Gnathopods and pereopods with articles not so stout.

Gnathopod 1: coxa narrower distally, about 0,7 times dorsal width, without antero-dorsal corner produced; article 6 slightly longer than article 5 with two spines on distal face in addition to those on either side of the dactyl.

Gnathopod 2 with enlarged article 6, unlike G1; length about 1,4 times G1; coxa length 1,2 times width, only 0,9 times length article 2; article 4 with right-angled bend; article 5 small, without pectinate spines; article 6 a little longer than article 2, maximum length 1,6 times maximum width, postero-proximal corner forming distinct lobe for almost 0,4 length article, palm oblique with several small spines on either side of 'cutting edge' followed proximally by small groove for tip of dactyl; dactyl claw-like, length 0,8 times maximum length article 6.

Pereopod 3: length 1,1 times G2; coxa like that of G2 only slightly longer.

Pereopod 4: coxa maximum width a little more than length, only slightly more narrow distally—posterior corner of excavation not produced as in female.

Pereopod 5 as long as P4; coxa width 1,5 times width article 2, length anterior lobe slightly less than half maximum width coxa; length posterior lobe less than 0,6 times maximum width coxa or only 0,7 times length article 2.

Pereopod 6: coxa, length anterior lobe 0,3 times width coxa, length posterior lobe a little less than coxa width.

P7, U1–U3 and telson like female.

Pleopods all of normal structure (not modified as in *Chiltonia*).

*Variations*

Females ranged in size from 1,0 to 4,1 mm with a mean of  $3,2 \pm 0,2$  mm ( $\pm 95\%$  c.l.;  $n = 70$ ). Males ranged in size from 1,5 to 2,6 mm with a mean of  $2,2 \pm 0,06$  mm ( $\pm 95\%$  c.l.;  $n = 76$ ). Males are thus significantly smaller than females ( $P < 0,01$ ). No specimens were as large as 4,5 mm as recorded by Barnard (1916) and one must assume this measurement included the antennae or to be an error.

All of the specimens examined varied little from the above descriptions. In some specimens the ommatidia of the eyes were more diffuse at the edges and almost confluent dorsally. Antenna 1 and 2 usually had a flagellum of six articles, increasing to seven in some females, or decreasing to five in some males but rarely in females. The antennae were almost equal in length in some specimens and varied from 0,2 to 0,25 times the body length. The condition of the mandible with a feathered seta on the molar usually occurred only on the right, rarely on



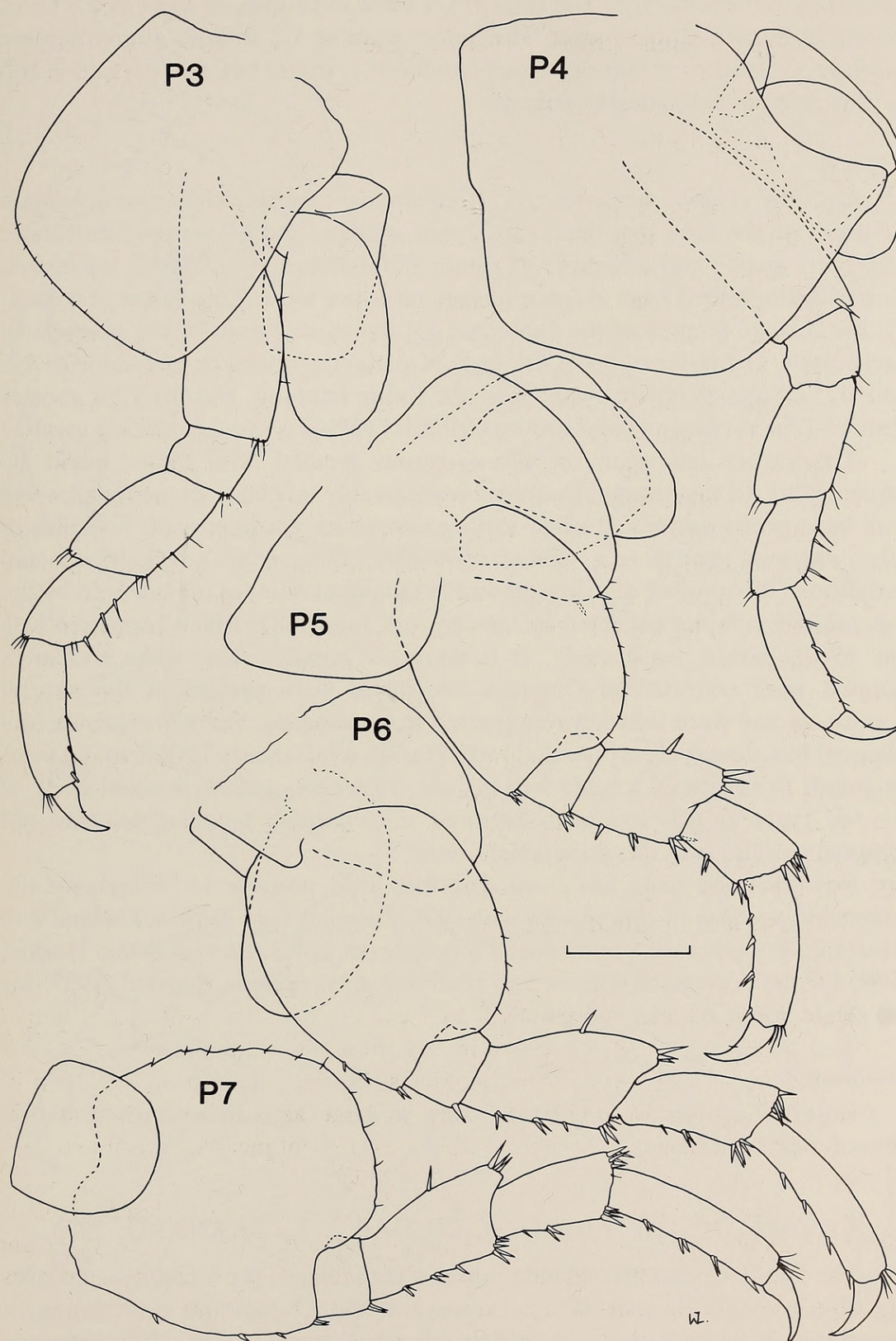


Fig. 3. *Afrochiltonia capensis* (Barnard). Lectotype female, 3,7 mm, pereopods 1-7.  
Scale bar = 0,2 mm.



the left as in the lectotype. The rami of U1 were sometimes as short as 0,6 times peduncle, particularly in males. The inner ramus of U2 without a medial spine was rare. Oostegites of females varied considerably in size but were expanded and as illustrated in ovigerous specimens.

#### Remarks

Griffiths (1976b) synonymized *Afrochiltonia capensis* with *Austrochiltonia subtenuis* on the basis that the male G2 was enlarged and U3 was one-articulate. However, apart from a number of minor differences, *Afrochiltonia capensis* is clearly distinguished from *Austrochiltonia subtenuis* by: (1) the shape of coxa 4; (2) the relative lengths of the antennae; (3) the stout nature of the pereopods, particularly in the female; (4) the lack of marginal spines on the rami of U1 and U2; (5) the gland cone on A2 is not visible laterally; and (6) P7 is shorter than P6. The synonymy proposed by Griffiths (1976b) is thus considered invalid.

The earlier confusion on non-ovigerous females with males might be explained by the fact that the males are considerably smaller than the females and may have been overlooked when sorting samples or confused with juveniles of other common species (e.g. *Melita zeylanica*). There is also a likely seasonal variation in the number of males present in the population, as is evidenced by the two random samples collected in January and June 1987, which contained 6/36 and 69/109 males, respectively. It is therefore possible that, when Barnard's samples were collected in October, few males were present in the natural population and were thus not represented in his samples. Further evidence of a seasonal breeding cycle is provided by the fact that in January 15/30 females were ovigerous as compared to only 9/40 in June. However, a more detailed study of the life cycle of this species is required to determine breeding seasons and seasonal variations in the male/female ratio.

Now that the male has been described it is possible to re-evaluate the systematic position of this species with that of similar taxa in New Zealand and Australia. In particular, I recommend retaining the genus *Austrochiltonia* Hurley, 1959, for the Australian species and reserving *Afrochiltonia* Barnard, 1955, for the single South African species.

#### Distribution

Kosi Bay, Zululand, to Olifants River, western Cape, in brackish-estuarine environments (endemic).

### REVIEW OF THE FAMILY CEINIDAE J. L. BARNARD, 1972

The family Ceinidae is divided into two subfamilies, the Ceininae—consisting of marine forms with cleft telsons—and the Chiltoniinae—consisting of freshwater-brackish forms with uncleft telsons (Barnard 1972b). It is generally distinguished from the Hyalidae (= Talitridae) by the form of U3 (e.g. Barnard 1972b), which is diagnosed by Barnard (1972a) as 'composed only of peduncle



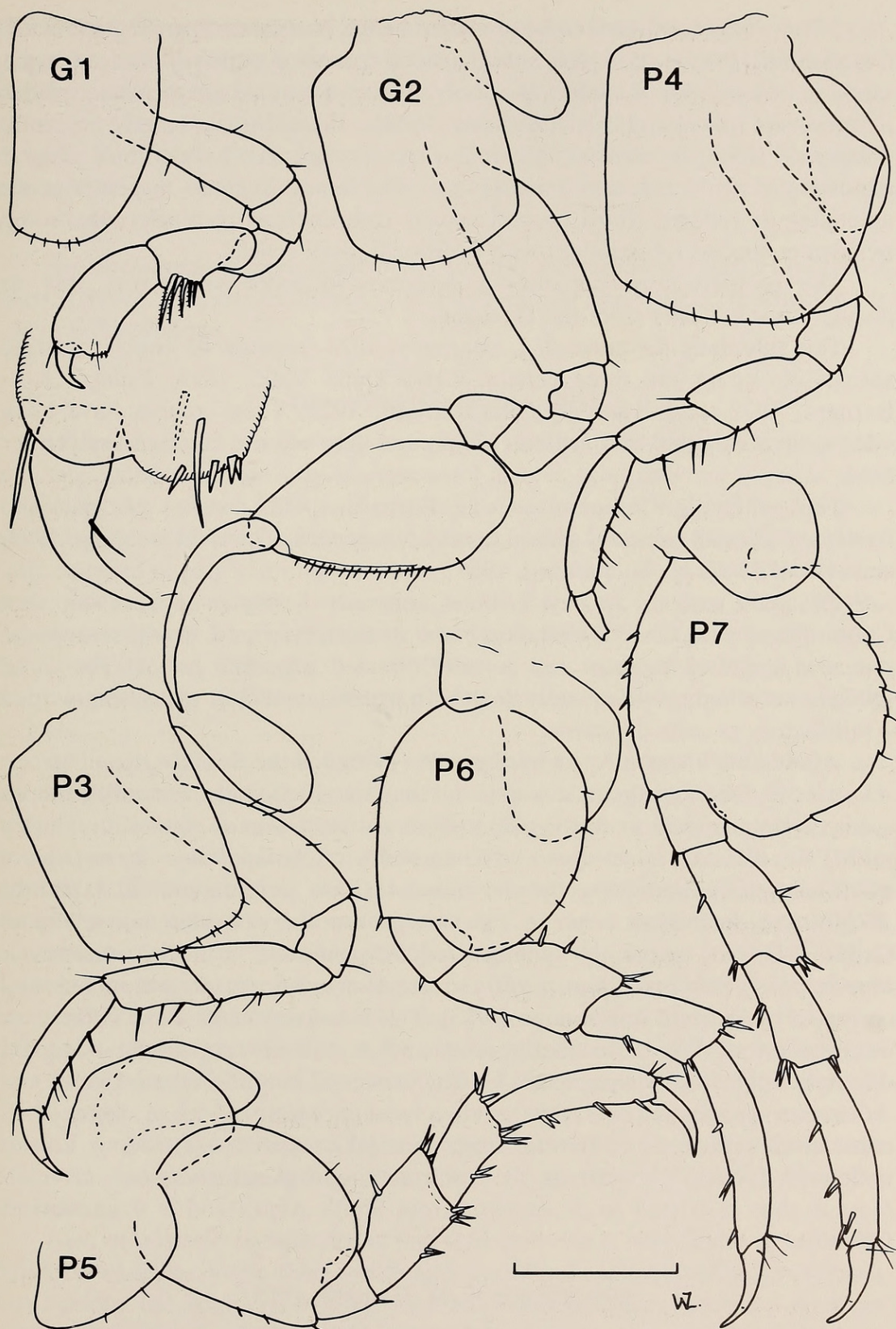


Fig. 4. *Afrochiltonia capensis* (Barnard). Male, 2.5 mm (SAM-A39686), pereopods 1-7. Scale bar = 0.2 mm.



... ' This diagnosis needs to be amended as the Australian species *Austrochil-tonia australis* (Sayce, 1901) has a third uropod consisting of two articles, a feature used to distinguish it from the only other described Australian species *A. subtenuis* (Sayce, 1902) (Williams 1962). In addition, I have recently discovered some undescribed Australian species that also have a third uropod consisting of a peduncle and a small ramus. The family diagnosis therefore needs amending as follows: 'third uropod usually composed of peduncle only, some freshwater species (Australian) with additional small article'.

The problem now remains to determine a more satisfactory way to distinguish this family from the Hyalidae.

The subfamily Ceininae J. L. Barnard, 1972, consists of entirely marine species placed in the three genera, *Ceina* Della Valle, 1893, *Taihape* J. L. Barnard, 1972, and *Waitomo* J. L. Barnard, 1972. These genera have been adequately diagnosed by Barnard (1972*b*) and they will not be discussed further here.

The subfamily Chiltoniinae J. L. Barnard, 1972, consists of brackish-freshwater species currently placed in only two genera, *Chil-tonia* Stebbing, 1899, and *Afrochil-tonia* K. H. Barnard, 1955.

*Chil-tonia*, endemic to New Zealand, is readily distinguished from the other Chiltoniinae by the unusual character of the first male pleopod, in which the inner ramus is modified to form 1-3 dorsally directed whip-like lashes. The three species concerned are adequately dealt with by Hurley (1954), who also provided a satisfactory generic diagnosis.

*Afrochil-tonia* was erected by Barnard (1955) for the South African species *A. capensis*, based on the mistaken belief that the gnathopods were alike in both sexes, a feature used to distinguish it from *Austrochil-tonia*, erected by Hurley (1959) for the Australian species. When males of *Afrochil-tonia capensis* were eventually recognized correctly and found to have an enlarged G2 (Griffiths 1976*b*), the distinction between the two genera was considered invalid and Griffiths (1976*b*) promptly synonymized *Afrochil-tonia* with *Austrochil-tonia*. However, *Afrochil-tonia* has priority over *Austrochil-tonia* as was noted and corrected by Barnard & Karaman (1982). This synonymy came about without an examination of the Australian species and in the absence of an adequate description *Afrochil-tonia capensis*. Having examined both the South African and Australian species I find this synonymy unsatisfactory, as *A. capensis* is considered sufficiently different from Australian species (including known undescribed ones) to warrant the resurrection of *Austrochil-tonia*. *Afrochil-tonia* is thus restricted to *A. capensis* from South Africa and is diagnosed as follows.

*Afrochil-tonia* K. H. Barnard, 1955

Males only about two-thirds size of females. Eyes ovato-circulate, occasionally with diffuse ommatidia at edges. Antenna 1 and 2 subequal in length, only about 0,2 times body length. Antenna 1 with ventral aesthetasc at base of



last two flagella articles. Gland cone of A2 not visible laterally. Maxilla 1 without palp, notched at palp's normal position. Coxae 1–4 deep. Coxa 4 with large, shallow posterior excavation, maximum width more than length (up to 1,5 times in female). Gnathopods 1 and 2 subchelate in both sexes; article 6 of G2 enlarged in male. Pereopods stout, particularly in female; P7 shorter than P6. Pleopod 1 not modified in male. Uropod 3 one-articulate. Telson entire, hemispherical, with evenly rounded distal margin.

*Austrochiltonia* is here resurrected for the Australian species *A. subtenuis* (Sayce, 1901), *A. australis* (Sayce, 1902) and several undescribed species, and is diagnosed as follows.

*Austrochiltonia* Hurley, 1959

Males of similar size or only marginally smaller than females. Eyes ovato-circulate without diffuse edges. Antenna 1 longer than antenna 2, more than 0,3 times body length. Antenna 1 with ventral aesthetasc at base of distal four or more flagella articles. Gland cone of A2 large, visible laterally. Maxilla 1 without palp, notched at palp's normal position. Coxae 1–4 deep. Coxa 4 with shallow or deep posterior excavation, maximum width equal to, or less than, length. Gnathopods 1 and 2 subchelate in both sexes; article 6 of G2 enlarged in male. Pereopods slender, P7 longer than P6. Pleopod 1 not modified in male. Uropod 3 with single ramus or ramus absent. Telson entire, subrectangular to slightly concave.

Although *Afrochiltonia* superficially resembles *Austrochiltonia* there are several differences that collectively are considered of generic significance. In particular the large coxa 4 of *Afrochiltonia capensis* is most unusual and is unlike any species of *Austrochiltonia* or *Chiltonia*. The small size of the male relative to the female is also unusual. In his revision of *Austrochiltonia*, Williams (1962) noted that the largest specimens were males but, in a more detailed study of *A. australis*, Smith & Williams (1983) found that the largest male was about 0,8 times as long as the largest female. In the present study of *Afrochiltonia capensis*, in which 76 males and 70 females were measured, the largest male was 2,6 mm and the largest female was 4,1 mm, a ratio of only slightly more than 0,6!

Other distinguishing characters of *Afrochiltonia*, apart from those given in the diagnosis and other minor differences, are the lack of marginal spines on the rami of uropod 1 and uropod 2 (except for one on the inner ramus) and the relatively few pectinate spines on article 5 of gnathopod 1 and gnathopod 2 (female).

Also of possible significance is that *Afrochiltonia* is only found in estuarine habitats, while *Austrochiltonia*—although found in brackish–freshwater habitats throughout the southern half of Australia—has not been recorded from an estuarine environment.

In view of the above, the genera of Ceinidae may now be distinguished according to the following key.





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