APPENDIX 2: TAXONOMIC NOTES

The majority of taxa found in St Georges Basin have been previously described in other systematic studies of southwest Pacific marginal-marine foraminifera (Albani, 1968a, 1968b, 1979; Hayward and others, 1997, 1999; Strotz, 2003), and because of this, only those taxa requiring revision or worthy of comment are described in detail. Species are grouped according to the families recognized by Loeblich and Tappan (1987).All taxa are illustrated in Figures 4–6.

Class FORAMINIFERA Eichwald, 1830

Subclass TEXTULARIIA Mikhalevich, 1980

Order LITUOLIDA Lankester, 1885

Superfamily HORMOSINOIDEA Haeckel, 1894

Family REOPHACIDAE Cushman, 1927

Genus *Leptohalysis* Loeblich and Tappan, 1984

Type species: *Reophax catella* Hoglund, 1947

Leptohalysis collinsi Bell, 1996

Fig. 4.4

Reophax sp. of Collins, 1974, p. 8.

Leptohalysis sp. of Bell and Drury, 1992, p. 12; Cotter, 1996, p. 204, fig. 4.5.

Leptohalysis catella (Höglund, 1950). Yassini and Jones, 1995, p. 67, fig. 49.

Leptohalysis collinsi Bell, 1996, p. 4, figs. 2a–h; Strotz, 2003, pl.1, fig. 4.

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Remarks. Loeblich and Tappan (1984) erected the genus *Leptohalysis* to include Höglund's (1947) small, elongate, campanulate-chambered forms of the *Reophax scotti* group. The species that have been assigned to this genus are similar morphologically, which has led a number of Australian authors (e.g., Collins, 1974; Bell and Drury, 1992; Cotter, 1996) to designate specimens as indeterminate species, assigned either to *Reophax* or *Leptohalysis*(Collins, 1974; Bell and Drury, 1992). Bell (1996) erected the species *L. collinsi* to include these indeterminate taxa, as well as specimens found in Port Dalrymple and the Tamar River in Tasmania. *L. collinsi* shows close affinities with *Leptohalysis catella* (Höglund) and is separated from the latter on its smaller size, more slender outline, and chamber shape, varying from rectangular to almost triangular. Specimens from St Georges Basin exhibit all these features.

Family KUNKLERINIDAE Rauzer-Chernousova and Reitlinger, 1986

Genus *Scherochorella* Loeblich and Tappan, 1984

Type species: *Reophax minuta* Tappan, 1940

Scherochorella barwonensis (Collins, 1974)

Figs. 4.1, 4.2

Reophax barwonensis Collins 1974, p.8, pl. 1, fig. 1; Apthorpe, 1980, pl. 29, fig. 7;

Strotz, 2003, p. 166; pl. 1, figs. 1–3.

Remarks. This taxon has been recovered from a number of estuaries along the east coast of Australia, but its identification, at both the genus and species level, has been contentious, due mainly to its variable morphology(Apthorpe, 1980; Yassini and Jones, 1995; Bell, 1996; Strotz, 2003). Strotz (2003) attributed this to the presence of both microspheric and megalospheric forms. Specimens recovered from St Georges Basin are conspecific with those recovered by Strotz (2003) from Tuross estuary, in southern New South Wales, with a subglobular proloculus, appressed chambers, depressed sutures, and both microspheric and megalospheric forms.

Family HORMOSINIDAE Haeckel, 1894

Genus *Warrenita* Loeblich and Tappan, 1984

Type species: *Sulcophax palustris* Warren, 1957

Warrenita? sp.

Fig. 4.8

Remarks. Specimens are tentatively assigned to *Warrenita*, based upon Loeblich and Tappan's(1987) concept. The elongate, arcuate, finely agglutinated test, and laterally compressed chambers that strongly overlap one another are suggestive of *Warrenita*. However, despite the rarity of specimens and the broken nature of the material, the aperture is apparently not a terminal, arcuate slit, as in *Warrenita* (Loeblich and Tappan, 1987), but is terminal and rounded (Fig. 3.11). The lack of material and, in particular, the lack of any specimens with a proloculus

make taxonomic placement difficult; therefore, it will remain in open nomenclature. No conspecific material has been described previously from any estuary in southeastern Australia.

Superfamily LITUOLIDOIDEA de Blainville, 1827

Family LITUOLIDAE de Blainville, 1827

Genus *Ammobaculites* Cushman, 1910

Type species: *Spirolina agglutinans* d'Orbigny, 1846

Ammobaculites exiguus Cushman and Brönnimann, 1948

Figs. 4.5–4.6

Ammobaculites exiguus Cushman and Brönnimann, 1948, p. 38, pl. 7, figs. 7–8; Hedley and others, 1967, p. 19, pl. 5, figs. 5a, b; Collins, 1974, p. 9; Bell, 1978, p. 134, fig. 4; Bell and Drury, 1992, p. 13, fig. 4.10; Hayward and Hollis, 1994, p. 203, pl. 1, figs. 17–19;Bell, 1996, pl. 1b; Hayward and others, 1999, p. 85, pl. 1, figs. 19, 20; Strotz, 2003, pl. 1, fig. 5.

Remarks. *Ammobaculites exiguus* is distinguished from other common marginal-marine species of *Ammobaculites*, including *A. crassus*, *A. dilitatus* and *A. exilis*, by its smaller size, inflated test, and indistinct sutures (Hayward and Hollis, 1994). It has previously been reported from a wide variety of geographic locations, including Australia (Collins, 1974; Bell, 1978; Strotz, 2003), New Zealand (Hayward and Hollis 1994; Hayward and others, 1999),

Japan (Nomura, 1981), North and Central America (Culver and Buzas, 1985; 1986; 1987) and west Africa (Debenay, 1990).

Genus *Simobaculites* Loeblich and Tappan, 1984

Type species: *Ammobaculites cuyleri* Tappan, 1940

Simobaculites barwonensis (Collins, 1974)

Figs. 4.7

Ammobaculites? *barwonensis* Collins 1974, p. 9, pl. 1. Figs. 3a, b

Ammobaculites barwonensis (Collins, 1974). Apthorpe , 1980, p.225, pl.28, figs.4,5,10; Strotz, 2003, p. 169, pl. 1, figs. 6, 7.

Remarks. In his original description of the species, Collins (1974) questioned the generic placement of this taxon in *Ammobaculites*, largely due to the lack of a clear terminal aperture. Later work by Apthorpe(1980) demonstrated the aperture is terminal and consists of an elongate slit or ellipse, inconsistent with *Ammobaculites*, but she chose to maintain Collins' (1974) generic assignment. All studies by subsequent workers have followed Apthorpe's (1980) lead and maintained the species in *Ammobaculites* (see Strotz ,2003, for a complete synonymy), despite the flattened outline of the test in section and the elongate, slit-like nature of the aperture. Both of these features are not representative of the genus *Ammobaculites sensu stricto*. Using Loeblich and Tappan's (1987) generic concept, *Ammobaculites* is characterized by a terminal aperture appearing rounded or circular in cross-section; therefore, this species is herein re-

assigned to the genus *Simobaculites.* The compressed nature of the test, its broad and ovoid uniserial chambers in the later portion, and its slit-like aperture are all features diagnostic of *Simobaculites* (Loeblich and Tappan 1987), based on the type species, *S. cuyleri* (Tappan).

Family TROCHAMMINIDAE Schwager, 1877

Genus *Paratrochammina* Brönnimann, 1979

Type species: *Paratrochammina madeirae* Brönnimann, 1979, emend. Brönnimann and Whittaker, 1988

Paratrochammina bartrami (Hedley, Hurdle, and Burdett, 1967)

Figs. 4.14, 4.15

Trochammina ochracea (Williamson, 1858). Heron-Allen and Earland, 1915, p. 619, fig. 28; Heron-Allen and Earland, 1922, p. 111.

Trochammina ochracea forma *heronearlandica* Rhumbler, 1938, text figs. 33a–37.

Trochammina bartrami Hedley and others, 1967, p. 13, 14, 21, 22, text figs. 9, 10, pl. 6, figs. 2a–c; Collins, 1974, p. 11.

Paratrochammina (*Lepidoparatrochammina*) *bartrami* (Hedley and others, 1967). Brönnimann and Whittaker, 1988,figs. 22A–C, 23B–L, 24E.

Rotaliammina bartrami (Hedley and others, 1967). Hayward and Triggs, 1994, pl. 1 figs. 10,11.

Paratrochammina bartrami (Hedley and others, 1967). Hayward and others 1999, p. 86,pl. 2, figs. 1–3.

Remarks. Brönnimann and Whittaker (1988) reassigned this species to *Paratrochammina* based upon its aperture, which is directly linked to the axial depression and watch-glass shaped test. Rhumbler (1938) established *Trochammina ochracea* (Williamson) forma *heronearlandica* for specimens matching *Trochammina ochracea* (Williamson) as illustrated by Heron-Allen and Earland (1915,1922). Heron-Allen and Earland's (1922) specimens were later synonymized by Hedley and others (1967) and placed into *Trochammina bartrami.* The only previous documentation of this species from Australia is by Collins (1974), who never illustrated his specimens but stated that his material is synonymous with that of Hedley and others(1967). The inclusion of Collins' (1974) specimens extends the range of *P. bartrami* in Australia from Port Phillip Bay to the north coast of New South Wales. Although Collins (1974) labeled his specimens "*Trochammina bartrumi* Hedley, Hurdle and Burnett", it is presumed that the misspelling of the species and author names were unintentional errors (*lapsus calami*).

Order LOFTUSIIDA Kaminski and Mikhalevich, 2000

Superfamily ATAXOPHRAGMIOIDEA Schwager, 1877

Family GLOBOTEXTULARIIDAE Cushman, 1927

Genus *Rhumblerella* Brönnimann, 1981

Type species: *Rhumblerella sepetibaensis* Brönnimann 1981

Rhumblerella subconica (Parr, 1950)

Figs. 5.1. 5.2

Eggerella sp. of Parr, 1945, p. 195, pl. 8, fig. 5.

Eggerella subconica Parr, 1950, p. 281, pl. 4, figs. 22a,b; Albani, 1968a, p. 14, fig. 24; Albani, 1979, p. 16. figs. 11, 12; Bell and Drury, 1992, p. 12, fig. 4.3.

Eggerella advena (Cushman, 1922). Apthorpe, 1980, pl. 27, figs. 7, 10.

Remarks. Previous authors (Parr 1945; Albani, 1968a, 1979; Bell and Drury, 1992) have assigned this species to the genus *Eggerella* based upon its subconical outline, finely agglutinated wall, and slit-like aperture located near the base of the apertural face. They have not, however, illustrated or discussed the microstructure of the test wall in their specimens. Loeblich and Tappan (1987) noted that, for the genus *Eggerella*, the wall is canaliculate. No St Georges Basin specimens have that wall structure. With the assumption that St Georges Basin material is conspecific with that recovered from other eastern Australian estuaries (Parr 1945; Albani, 1968a, 1979; Bell and Drury, 1992; Strotz, 2003), all these specimens from eastern Australia are herein reassigned to *Rhumblerella*. This placement is based upon the subconical shape of the test, the low number of chambers in the final whorl (3–4), the noncanaliculate wall, and the nature of the aperture, consisting of a low interiomarginal arch in a sub-axial position.

Albani (1979) distinguished *R. subconica* from the other similar taxon found in eastern Australian estuaries, *Eggerella australis* Collins, based upon its more elongate, more conical shape and its more coarsely arenaceous wall. Assuming *E. australis* is also not caniculate, test outline is the preferred character for differentiating the two taxa, as specimens of *R. subconica* from St Georges Basin exhibit variability in the coarseness of the test wall.

Order LAGENIDA Delage and Herouard, 1896

Superfamily POLYMORPHINOIDEA d'Orbigny, 1839

Family POLYMORPHINIDAE d'Orbigny, 1839

Genus *Guttulina* d'Orbigny, 1839

Type species: *Polymorphina* (les Guttulines) *communis* d'Orbigny, 1826

Guttulina regina (Brady, Parker, and Jones, 1870)

Fig. 5.11

Polymorphina regina Brady, Parker, and Jones, 1870, p. 241, pl. 41, fig. 32a, b; Brady, 1884, p. 571, pl. 73, figs. 11–13.

Guttulina regina (Brady, Parker, and Jones, 1870). Cushman and Ozawa, 1930, p. 34, pl. 6, figs. 1,2; Albani, 1968b, p. 104, pl. 8, figs. 14, 15; Yassini and Jones, 1995, p. 139, fig. 711.

Remarks. This species is distinguished from other members of *Guttulina* by its overall ovate test shape, with rounded posterior end and more acute apertural end, its distinct and depressed sutures, and its prominent ornament composed of fine longitudinal costae.

Previous records of this species have all been confined to localities where salinity levels and open ocean influence are high. *Guttulina regina* has been previously recorded in southeastern Australia from environments extending from estuarine (Albani, 1968b) and shallow marine (Cushman and Ozawa, 1930) to inner and outer shelf (Brady and others, 1870; Brady, 1884). Previous records of *G. regina* in New South Wales have been in the central and northern parts of the state (Cushman and Ozawa, 1930; Albani, 1968b) and, therefore, this occurrence at

St Georges Basin extends its range to the New South Wales south coast. However, given that the type locality for *G. regina* is in Tasmania, presumably it should be found along the entire south-eastern Australian coastline.

Order ROTALIIDA Delage and Herouard, 1896

Superfamily ROTALIOIDEA Ehrenberg, 1839

Family ROTALIIDAE Ehrenberg, 1839

Genus *Ammonia* Brünnich, 1772

Type species: *Nautilus beccarii* Linné, 1758

Ammonia aoteana (Finlay, 1940)

Figs. 6.9, 6.10, 6.11

Stebulus aoteanus Finlay, 1940, p. 461

Ammonia aoteanus (Finlay, 1940). Hedley and others, 1967, p. 47, pl. 11, figs. 4a–c, text- figs. 56–60; Collins, 1974, p.40, pl. 3, figs. 30a–c; Strotz, 2003, p. 176, pl. 3, figs. 5–8.

Ammonia beccarii (Linné, 1758). Albani, 1968a, p. 30, fig. 129; Albani, 1968b, p. 110, pl. 9, figs. 7, 9,10; Albani, 1979, p. 40, fig. 88-1.

Remarks. The placement of this species has been a point of contention, and specimens have been referred to by a number of names (see Bell, 1996, and Strotz, 2003, for a synopsis). Strotz (2003)assigned the taxon to *Ammonia aoteana* (Finlay) based upon the lack of strongly

beaded sutures on the umbilical side. This assignment was later independently supported by Hayward and others (2004), who also designated species of *Ammonia* from temperate southwest Pacific environments as belonging to *A. aoteana* (Finlay), based upon genetic and morphometric analysis. St Georges Basin specimens are considered conspecific with those of Strotz (2003) and are therefore assigned to *A. aoteana* (Finlay).

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