



## Note

## Range extension of two invasive crab species in eastern Australia: *Carcinus maenas* (Linnaeus) and *Pyromaia tuberculata* (Lockington)

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Relatively few introduced crabs are presently known from Australian waters. The present report significantly extends the documented range of the European Shore Crab *Carcinus maenas* (Linnaeus) and the Fire Crab *Pyromaia tuberculata* (Lockington) in eastern Australia, based on recently collected specimens now deposited in the Australian museum, Sydney (AM), and old collections in the Macleay museum, University of Sydney (MM) (Appendix).

*Carcinus maenas* is well known as an invasive and destructive species (Behrens Yamada, 2001). The species is native to the northeastern Atlantic but is now established in southern Australia, South Africa, the northern Pacific and Atlantic coasts of North America (Carlton and Cohen, 2003). *Carcinus maenas* was first reported in Australia in 1900 from Port Phillip Bay, Victoria, and is believed to have arrived on hull fouling on ships or amongst discarded, solid, marine ballast (Fulton and Grant, 1902). Owing to the busy shipping trade between European ports and Port Phillip Bay in the 19th century, it is likely that Port Phillip Bay was the original site of introduction (Proctor and Thresher, 1997). *Carcinus maenas* has since been reported from the Swan River, Western Australia, Gulf St. Vincent and the Coorong, South Australia, eastern Tasmania and Port Phillip Bay, Victoria, to Narooma, southern New South Wales (Furlani, 1996; Proctor and Thresher, 1997) (Fig. 1(A)).

The present new eastern Australian records of *C. maenas* from Jervis Bay, Lake Conjola, and the Sydney area extend the documented range in New South Wales from Nangudga Lake, near Narooma (36°15'S), northwards by almost 300 km. Aside from the listed specimens, *C. maenas* was also sighted in the littoral zone by the present author at the following localities on the

New South Wales coast: Plantation Point, Jervis Bay (35°05'S) in December 1992 and November 1997, Durras lake (35°38'S), Burrill lake (35° 22'S) and Narrawallee inlet (35°18'S) in November 1985, and regularly between 1977 and 1987 at Kyeemagh, Botany Bay (33°57'S) (approximately 15 km south of Sydney).

In view of the specimens of *C. maenas* reported herein, the absence of previous records of the species north of Narooma is somewhat surprising and it would be tempting to assume a recent northward range expansion of the species. It is noteworthy, however, that the two Macleay museum specimens from Sydney were collected prior to 1936 and 1891 respectively. Thus, *C. maenas* has probably been present in the Sydney area for at least as long as it has been known from Port Phillip Bay, Victoria, i.e., more than 100 years. Stephenson and Campbell (1960) examined one of the Macleay museum specimens but considered the locality 'suspect', presumably owing to the significant range extension entailed. The additional specimens reported herein, however, indicate that reservations expressed by Stephenson and Campbell (1960) were unwarranted. Moreover, the majority of Crustacean specimens in the Macleay museum from the Sydney region were collected from Port Jackson (33°51'S), the estuary on which the city of Sydney was established. The two 'Sydney' specimens of *C. maenas* are also likely to have been collected in Port Jackson. Thus, rather than indicating a relatively recent 'northerly' range expansion, the paucity of records of *C. maenas* north of Narooma more likely reflects a low level of collecting effort and poor general public awareness. Sightings of *C. maenas* from other New South Wales localities have probably been mistaken for other species, or simply not recognised as significant. For instance, on three separate occasions in January 1993, fishers at Wallaga lake, Bermagui (36°22'S), mistook *C. maenas* for juvenile *Scylla serrata* (Forskål) (locally

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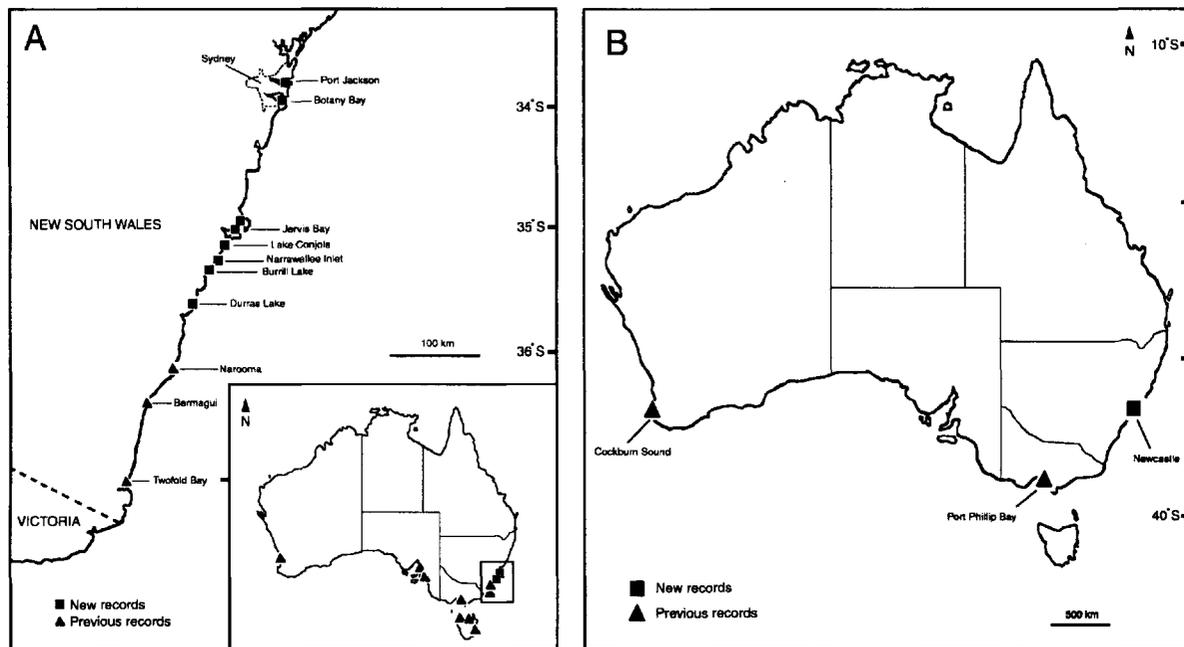


Fig. 1. (A) Distribution of *Carcinus maenas* in Australia. (B) Distribution of *Pyromaia tuberculata* in Australia.

known as the Mud Crab). Greater public awareness of pest species, such as *C. maenas*, could lead to additional records and a more complete estimate of the species distribution in New South Wales.

The Fire Crab, *P. tuberculata*, is native to the Pacific coast of North America but has been introduced to Japan, New Zealand, Brazil, Argentina and southern Australia, probably as larvae in ballast water (Poore, 2004). *Pyromaia tuberculata* probably arrived in Australia within the last three decades, being first collected from Cockburn Sound, Western Australia (32°10'S) in 1978 (Morgan, 1990). The species has since been reported from Port Phillip Bay, Victoria (37°58'S), where it has been present since at least 1990 (Poore and Storey, 1999). Therefore, the discovery of *P. tuberculata* from eastern Australia, off Newcastle, New South Wales (32°53'S), represents a considerable northward range extension encompassing about 1500 km of coastline (Fig. 1(B)). Whether the specimens reported herein are part of a 'natural' expansion of the Victorian population, or whether the Newcastle population is the result of an independent introduction, remains to be determined. Both specimens reported here are ovigerous females suggesting that a breeding population probably exists in the Newcastle area.

The range extensions reported here of *C. maenas* and *P. tuberculata* are significant in indicating that the ranges of these species are considerably underestimated in eastern Australia. Both species are invasive and further study is required to adequately assess their impacts and modes of dispersal.

## Appendix

Specimens of *C. maenas* and *P. tuberculata* examined. Measurements of specimens indicate carapace length.

### Specimens of *C. maenas* examined

AM P67863, 1 male (29.8 mm), E end of Silver Beach, Kurnell, Botany Bay, 34°00'S, 151°12'E, intertidal, amongst shelly sand and boulders adjacent to rock platform, S. Ahyong, Mar 1978; AM P67864, 1 female (42.4 mm), SE side Lake Conjola, 35°16'S, 150°27'E, near Caravan park, intertidal, amongst oyster encrusted boulders, S. Ahyong, Easter 1992; AM P67865, 1 male (51.8 mm), Carama Inlet, Jervis Bay, 35°01.0'S, 150°44.9'E, P. Clarke, 27 Oct 1988; MM C402, 1 male (13.5 mm), Sydney [probably Port Jackson], before 1891; MM C403, 1 male (45.0 mm), Sydney [probably Port Jackson], before 1936.

### Specimens of *P. tuberculata* examined

AM P67179, 2 ovigerous females (14.5–15.2 mm), E of Newcastle, 32°53'S 152°00'E to 32°54'S 151°59'E, 73–77 m, K96-05-16, K. Graham, 28 Mar 1996.

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