The changing nature of rock-wallaby (*Petrogale*) research 1980–2010

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Members of the endemic Australian macropodid genus *Petrogale* (rock-wallabies) have been of enduring scientific interest since the first species (brush-tailed rock-wallaby, *Petrogale penicillata*) was described in 1825 (Gray 1825). Although J. E. Gray initially placed *penicillata* in the genus *Kangurus* (later *Macropus*), in 1837, recognising its many unique features, he made it the type species for a new genus *Petrogale* (Gray 1837).

For the first 160 years the scientific investigation of rock-wallabies was dominated by taxonomy and in this age of exploration at least 23 rock-wallaby species/subspecies were discovered and described (Eldridge 1997*a*). However, taxonomic stability has been slow to emerge, with the number of recognised species oscillating between four and 11 for well over a century (Fig. 1). In fact, it is only in the last 10 years that the beginnings of a consensus has been established, with 16 species recognised (Fig. 1). This large number of species makes rock-wallabies one of the most successful groups of extant macropodids, representing 26% (16 of 61) of recent species (Eldridge 2010).

Rock-wallabies are also of interest because, despite being relatively recently derived (Campeau-Péloquin *et al*. 2001; Meredith *et al*. 2008), they possess a unique suite of morphological, ecological and behavioural adaptations that have enabled them to colonise rocky habitat across mainland Australia (Eldridge 2008). They now inhabit a remarkable diversity of environments ranging from tropical to temperate and arid to mesic, but are not found in Tasmania (Eldridge 2008).

Their naturally patchy distribution and seemingly highly mutable genomes (Eldridge and Johnston 1993) appear to have combined to produce an array of chromosomal diversity that is remarkable not just within marsupials but also amongst vertebrates (Eldridge and Metcalfe 2006). This diversity has made rock-wallabies an internationally recognised model for the study of chromosome evolution and speciation (Sharman *et al*. 1990; Eldridge and Close 1993; King 1995). They have also emerged as influential models in the study of population biology (Spencer *et al*. 1998; Eldridge *et al*. 2001*a*; Hazlitt *et al*. 2004; Delean *et al*. 2009), conservation biology (Eldridge *et al*. 1999) and wildlife management (Kinnear *et al*. 1988, 2002).

Several rock-wallaby species have been the focus of long-running conservation efforts (Lim *et al*. 1987; Eldridge *et al*. 2004; Kinnear *et al*. 2010). The three southern Australian species (brush-tailed, black-footed (*P. lateralis*) and yellow-footed (*P. xanthopus*) rock-wallabies) have all declined significantly in range and abundance in the last 150 years and are listed as 'Vulnerable' under the Federal *Environment Protection and Biodiversity Conservation Act 1999*. The only other rock-wallaby species listed federally is the highly localised Proserpine rock-wallaby (*P. persephone*) from central coastal Queensland, which is 'Endangered'. Three other species (monjon (*P. burbidgei*), Cape York rock-wallaby (*P. coenensis*) and Sharman's rock-wallaby (*P. sharmani*)), all from northern Australia, are listed by the IUCN as 'Near Threatened', while the nabarlek (*P. concinna*) is regarded as 'Data Deficient' (IUCN 2010).

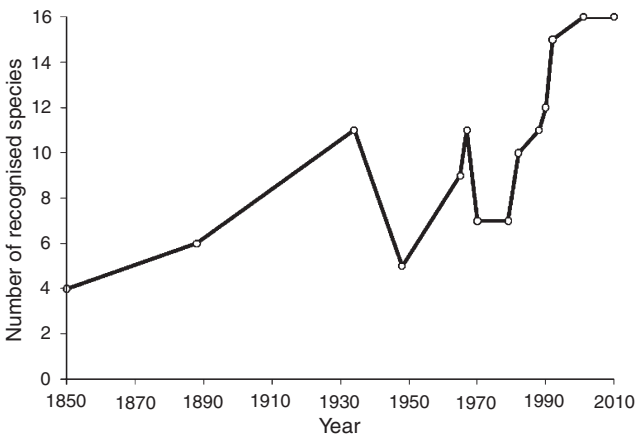

Fig. 1. Changes in the number of recognised rock-wallaby species from 1850 to 2010 (Eldridge 1997*a*; Eldridge *et al*. 2001*b*; Van Dyck and Strahan 2008).

For all these reasons, interest in and knowledge of rock-wallaby continues to expand rapidly. An ISI Web of Knowledge (www.wokinfo.com) search on 25 June 2010 revealed 248 rock-wallaby papers: 15 published in the period 1965–79, 89 in 1980–95 and 144 in the last 15 years (1996–2010). In the last 30 years research output has been dominated (51%: Fig. 2) by just four species (brush-tailed, black-footed, yellow footed and allied (*P. assimilis*) rock-wallabies), most likely reflecting their accessibility and proximity to major urban centres (and therefore universities), as well as the three southern species being of long-standing conservation concern. While output on the three temperate-zone species has continued to increase (Fig. 2),

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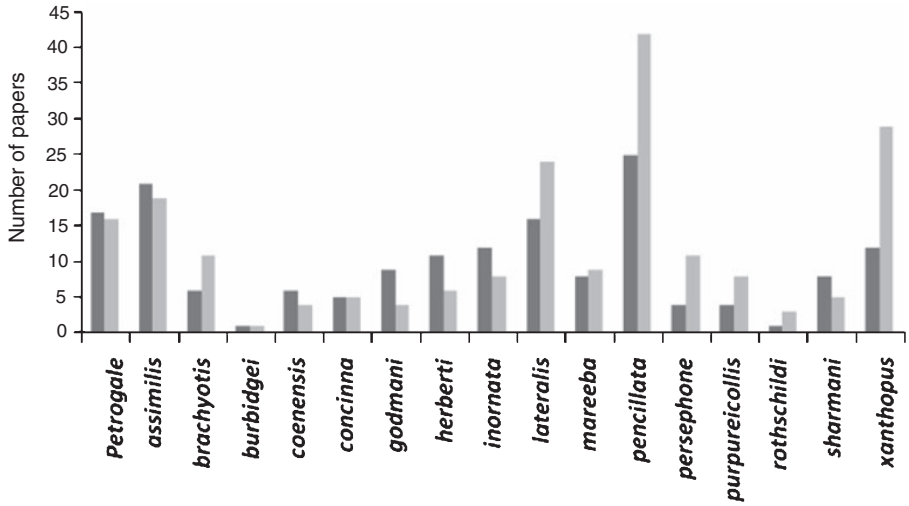

Fig. 2. The number of rock-wallaby papers published since 1980 grouped by study taxon for the years 1980–95 (dark shading) and 1996–2010 (light shading).

research on the allied rock-wallaby has started to decline due to the cessation of the long running 'Black Rock' field study by James Cook University researchers, and the end of rock-wallaby genetics research at Macquarie University. The latter has also contributed to a decline in research output (Fig. 2) for almost all seven of the coastal Queensland species (Cape York, Godman's (*P. godmani*), Mareeba (*P. mareeba*), Sharman's, allied, unadorned (*P. inornata*) and Herbert's (*P. herberti*) rock-wallabies). However, over the same period research on several previously poorly known species (Proserpine, purple-necked (*P. purpureicollis*) and short-eared (*P. brachyotis*) rock-wallabies) has increased (Fig. 2). The monjon and Rothschild's (*P. rothschildi*) rock-wallaby, both from Western Australia's north, remain severely neglected (Fig. 2) and should be made a high priority for future studies, as should the nabarlek which has been little studied, and now appears to be declining across its range (Pearson 2009).

Over the last 30 years of rock-wallaby research the topics investigated have also been highly skewed. The period 1980–95 was dominated (61%) by publications on rock-wallaby genetics, parasites and distribution (Fig. 3). Since 1995, genetic studies have continued to dominate (24%), but other areas, including studies of ecology, reproduction, physiology and behaviour (Fig. 3), have also grown strongly although many more are still needed. In the last 15 years, papers on rock-wallaby management have increased dramatically (over six-fold), reflecting a marked shift in both interest and funding to more applied areas of research. This trend is likely to continue. While research on parasites has remained strong over the last 15 years, studies on species distribution have declined substantially despite many issues remaining unresolved. These include determining the western limit of the seven eastern Queensland species, the location of the boundary between *P. lateralis* and *P. rothschildi* in north-west Western Australia, as well as the boundary between *P. purpureicollis* and *P. brachyotis* around the Queensland/Northern Territory border. In light of ongoing climate change, it would also be timely to re-examine the contact/hybrid zones between the parapatric eastern Queensland species, 25 years after their initial documentation (Briscoe *et al*. 1982; Eldridge and Close 1992; Bee and Close 1993).

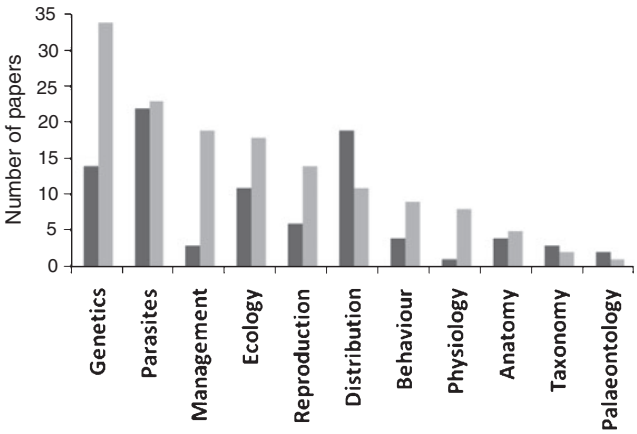

Fig. 3. The number of rock-wallaby papers published since 1980 grouped by research topic for the years 1980–95 (dark shading) and 1996–2010 (light shading).

In light of the sustained, but sometimes disparate, research and management interest in this group of macropodids, the First National Rock-wallaby Symposium was held in September 1994, at Oraparina in the Flinders Ranges, South Australia, and resulted in the publication of a special issue of *Australian Mammalogy* (**19**(2), 109–339) in 1997. The Symposium's success can be gauged from the fact that one of the meeting's recommendations was that similar symposia should be held regularly; every 2–5 years (Eldridge 1997*b*). The Second Rock-wallaby Symposium was held in April 2000 at Alice Springs, Northern Territory, on the back of the scientific meeting of the Australian Mammal Society. So by 2010 the Third National Rock-wallaby Symposium was well overdue. This meeting was held in June

2010 at the Shine Dome, Australian Academy of Science, Canberra, following the 56th scientific meeting of the Australian Mammal Society. The 30 papers and posters presented were heavily management and brush-tailed rock-wallaby oriented (both ~50%), although new data on South Australian's black-footed rock-wallabies (*P. lateralis* MacDonnell Ranges race) and the short-eared rock-wallaby (*P. brachyotis*) were also prominent.

The papers derived from this Symposium are presented here in this special issue of *Australian Mammalogy*, and significantly advance our knowledge on several fronts. Although data are presented on a limited number of rock-wallaby species, this does still reflect the current state of rock-wallaby research in Australia. Despite this continuing imbalance, data are steadily accumulating for many species and it is hoped that we will soon be in a position to make informed generalisations about rock-wallaby biology and determine what aspects are likely to be species and environment specific. This will greatly facilitate the targeting and prioritisation of research to fill significant gaps in our knowledge. Meanwhile, there is no doubt that this intriguing group will continue to fascinate.

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