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ABSTRACTS OF OCCASIONAL PAPERS

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WILDLIFE OCCASIONAL PAPER NO. 1

TITLE: RELATIONSHIPS WITHIN THE CHELIDAE (TESTUDINES : PLEURODIRA) OF AUSTRALIA AND NEW GUINEA (1974)

AUTHORS: Andrew A. Burbidge,[A] John A.W. Kirsch[B] and A.R. Main[C]

ADDRESSES:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, Western Australia, 6065.

[B]Department of Biology and Peabody Museum, Yale University, New Haven, Connecticut, USA 06500.

[C]Department of Zoology, University of Western Australia, Nedlands, Western Australia, 6009.

ABSTRACT:

A comparative study of the Chelidae of Australia and New Guinea based on morphological and serological data showed that Pseudemydura umbrina has no close relatives. It is as distantly related to the long-necked Chelodina as it is to the other short-necked genera, Elseya and Emydura. The latter genera are separated on both morphological and serological grounds but are more closely related to each other than to any other group. Chelodina oblonga is unique among Australian chelids in possessing neural plates and the remaining species of Chelodina can be divided into two groups about as distinct from each other as Emydura is from Elseya.

We believe that P. umbrina and C. oblonga have been isolated in the southwest of Australia since the Cretaceous. Speciation in the other groups is believed to be due to isolation resulting from increasing aridity since the Oligocene. Pleistocene land bridges allowed movement between Australia and New Guinea but no migration occurred between the southeast and southwest of Australia. The lack of extant species in Tasmania is attributed to its relatively cool climate, both now and in the Pleistocene.

CONTENTS: 18pp. Various maps, figures, plates and tables of results of study.

CITATION: Burbidge, A.A., Kirsch, J.A.W. and Main, A.R. (1974). Relationships within the Chelidae (Testudines : Pleurodira) of Australia and New Guinea. Copeia 2. 392-409

WILDLIFE OCCASIONAL PAPER NO. 2.

TITLE: THE BIRDLIFE OF THE BLACKWOOD RIVER ESTUARY (1975).

AUTHOR: J.A.K. Lane[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, Western Australia 6065.

ABSTRACT:

The study had three objectives: to identify the species of waterbirds using the estuary; to determine their abundance and note changes throughout the year; to identify areas most important to waterbirds as habitat. 57 species of birds were recorded during the 16 month study period, their numbers being lower than those of other known lower-west coastal estuaries. A change in species composition and numbers of birds was noted to correspond to the migratory influx of birds from the northern hemisphere and from other parts of the state. A number of unusual features were noted, the presence of Double-banded Dotterels and Eastern Golden Plovers, and the absence or rarity of Avocets and Pied Stilts.

The impact of dredge-mining was considered likely to affect the Black Swan population of the estuary most noticeably.

CONTENTS: 39pp. Maps, graphs, tables and diagrams with Appendices of birds sighted, comparison with Leschenault Inlet and food consumption of the Black Swan.

CITATION: Lane, J.A.K. (1975). The Birdlife of the Blackwood River Estuary. In Technical Report 7. Environmental Study of the Blackwood River Estuary. (Report to the Estuarine and Marine Advisory Committee of the E.P.A.).

WILDLIFE OCCASIONAL PAPER NO. 3

TITLE: HAMLET'S FATHER'S GHOST: THE WESTERN AUSTRALIAN DESERTS IN A GOOD YEAR (1976)

AUTHORS: John A.W. Kirsch[A] and Andrew A. Burbidge[B]

ADDRESSES:

[A]Department of Biology and Peabody Museum, Yale University, New Haven, Connecticut, U.S.A. 06520

[B]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, Western Australia, 6065

ABSTRACT:

A survey between 4-21 March, 1975 of three sites proposed as part of a series of Nature Reserves in the Great Victorian and Gibson Deserts of Western Australia. The journey and its highlights are described, relating the excitement of trapping rare marsupials in the inhospitable desert environment. A total of 22 species of native and five of introduced mammals were collected as well as numerous reptiles. The article aims to overcome the misconception that deserts are lifeless, presents some historical background of the survey area and presents the results of the survey.

CONTENTS: 8pp. Various plates and a map of the route followed by the survey party.

CITATION: Kirsch, J.A.W., and Burbidge, A.A. (1976). Hamlet's Father's Ghost. The Western Australian Desert in a Good Year. Discovery 11, 60-67.

WILDLIFE OCCASIONAL PAPER NO. 4

TITLE: VARIATION AND NATURAL HYBRIDIZATION IN THE CONOSTYLIS ACULEATA R.BR. SPECIES GROUP NEAR DAWESVILLE, WESTERN AUSTRALIA. (1977)

AUTHOR: Stephen D. Hopper[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, Western Australia, 6065.

ABSTRACT:

Variation was studied in allopatric and sympatric populations of Conostylis aculeata.R.Br., C. candicans Endl., and C. pauciflora Hopper near Dawesville, on the Swan River Coastal Plain. When in allopatry the three species were found to be morphologically similar but distinguishable by hybrid index analysis. They also showed variable but overlapping habitat preferences. C. pauciflora was morphologically intermiediate between C. aculeata and a coastal ecotype of C. candicans. Sympatric populations of two pairs of species, C. candicans - C. aculeata and C. pauciflora - C. aculeata, contained intermediate hybrids with slightly reduced pollen fertility relative to the parents. Hybrid populations were confined to ruderal habitats. Ecological factors appeared to be primary in maintaining isolation between the species, since indiscriminate pollination occurred in sympatric populations, and hybrids were abundant and fertile. The taxonomic and evolutionary implications of natural hybridization in the C. aculeata group, including the possibility of a hybrid origin of C. pauciflora, are discussed.

CONTENTS: 17pp. Various maps, plates, figures and tables of results of the study

CITATION: Hopper, S.D., (1977). Variation and Natural Hybridization in Conostylis aculeata R.Br. Species Group near Dawesville, Western Australia. Aust. J. Bot. 25, 395-411.

WILDLIFE OCCASIONAL PAPER NO.5

TITLE: A MULTIVARIATE MORPHOMETRIC STUDY OF SPECIES RELATIONSHIPS IN KANGAROO PAWS (ANIGOZANTHOS LABILL. AND MACROPIDIA DRUMM. EX HARV.: HAEMODORACEAE) (1977)

AUTHORS: Stephen D. Hopper[A] and N.A. Campbell[B]

ADDRESSES:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, Western Australia, 6065.

[B]Division of Mathematics and Statistics, CSIRO Private Bag, P.O., Wembley, W.A. 6014.

ABSTRACT:

Multivariate morphometric analyses of floral and leaf structure and an examination of seed morphology of the 12 kangaroo paw species were undertaken to clarify taxonomic issues and phylogenetic relationships in the group.

The study demonstrates substantial morphological differences between Macropidia Drumm. ex Harv. and Anigozanthos Labill., and argues for their reinstatement as separate genera. Sufficient differences among A. bicolor Endl., A. gabrielae Domin and A. viridis Endl. are also established to justify their recognition as valid taxonomic species. Other groups of closely related Anigozanthos species are identified and the division of the genus into only two sections, Anigozanthos and Haplanthesis, characterized by branched and unbranched flowering stems, is advocated.

Phylogenetic trends based on morphological relationships are discussed.

CONTENTS: 22pp. Various tables, figures, plates and maps of the results of the study.

Hopper, S.D. and Campbell, N.A., (1977). A Multivariate Morphometric study of species relationships in Kangaroo Paws (*Anigozanthos* Labill and *Macropidia* Drumm. ex Harv: *Haemodoraceae*). Aust. J. Bot. 25, 523-44.

WILDLIFE OCCASIONAL PAPER NO. 6

TITLE: THE STRUCTURE AND DYNAMICS OF A HYBRID POPULATION OF ANIGOZANTHOS MANGLESII D. DON AND A. HUMILIS LINDL. (HAEMODORACEAE) (1977)

AUTHOR: Stephen D. Hopper[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, Western Australia, 6065.

ABSTRACT:

The structure of a hybrid kangaroo paw population (Anigozanthos Labill.) in the shire cemetery at Gingin, Western Australia, was analysed from multivariate morphometric, pollen fertility and floral colour data. A. manglesii D. Don. comprised 87% of the population of 9547 flowering individuals in 1976, and occupied the lower, wetter areas of the cemetery to the exclusion of A. humilis Lindl. A. humilis (11% of the population) occurred at the greatest density on the higher, drier areas. The intervening ecotonal regions were occupied by both species and by the majority of F_1 hybrids (0.5% of the population) and backcrosses (c.2%). Census data documented a threefold increase in the number of A. manglesii individuals, a slight increase in the number of F_1 hybrids and a decrease in the number of A. humilis by a third over a 3-year study period.

These data suggest the occurrence of a limited amount of introgressive gene exchange in the face of potent barriers to interspecific hybridization.

CONTENTS: 10 pp. Various figures, maps and tables of the results of the study.

CITATION: Hopper, S.D., (1977). The structure and dynamics of a hybrid population of *Anigozanthos manglesii* D. Don and *A. humilis* Lindl. (Haemodoraceae). Aust. J. Bot. 25, 413-22.

WILDLIFE OCCASIONAL PAPER NO. 7

TITLE: AN IMPROVED BAT-COLLECTING TECHNIQUE (1977)

AUTHORS: W.K. Youngson[A] and N.L. McKenzie[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, Western Australia, 6065.

ABSTRACT:

A portable generator, floodlights, a spotlight and a shotgun provide a means of collecting a wide range of bat species in a relatively short time. The system is flexible and can be used in a variety of situations beyond the scope of mist-nets and other static collecting devices.

CONTENTS: 2pp.

CITATION: Youngson, W.K., and McKenzie, N.L. (1977). An improved Bat-collecting technique. Bull. Aust. Mamm. Soc. 2, 20-21.

WILDLIFE OCCASIONAL PAPER NO.8

TITLE: THE REPRODUCTIVE CAPACITY OF ANIGOZANTHOS MANGLESII D.DON., A. HUMILIS LINDL. AND THEIR HYBRIDS IN A WILD POPULATION. (1977)

AUTHOR: Stephen D. Hopper[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, Western Australia, 6065.

ABSTRACT:

The flower production, fruit set, seed set and seed germination of parental and hybrid Anigozanthos individuals from the Gingin cemetery, Western Australia, were investigated to establish whether differences in reproductive capacity could have been responsible for observed short-term numerical changes in the population. A. manglesii had a six- to ninefold reproductive advantage over A. humilis due to greater seed set and better germination. F_1 hybrids and backcrosses had reproductive capacities equivalent to or slightly better than A. humilis. The agreement between calculated reproductive capacity values and the trend of numerical changes in the cemetery supports the conclusion that differences in reproductive performance have played a significant role in the short-term dynamics of the population.

CONTENTS: 6pp. Tables of results of the study.

CITATION: Hopper, S.D., (1977). The reproductive capacity of *Anigozanthos manglesii;* D.Don., *A. humilis* Lindl. and their hybrids in a wild population. Aust. J. Bot. 25, 423-8.

WILDLIFE OCCASIONAL PAPER NO. 9

TITLE: PROGENY TRIALS IN AN INTROGRESSIVE HYBRID POPULATION OF ANIGOZANTHOS LABILL. (HAEMODORACEAE).(1977)

AUTHOR: Stephen D. Hopper[A]

ADDRESS:

[A]Botany Department, University of Western Australia, Nedlands, W.A. 6009.
Present address: Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

The floral morphology and pollen fertility of progeny from open-pollinated plants in a hybrid population of A. manglesii D. Don and A. humilis Lindl. were measured to investigate patterns of gene exchange occurring between hybrid and parental individuals. Introgression occurs where the two species and F_1 hybrids grow in close proximity in the population but the possibility of more backcrossing to A. manglesii than to A. humilis remains an open question on present evidence. The morphological effects of hybridization became cryptic in some cases within one and in most cases within two generations of backcrossing. The possible evolutionary significance of natural hybridization between A. manglesii and A. humilis is discussed in the light of these results.

CONTENTS: 9pp. Tables, figures and plates used to expand the discussion in the text.

CITATION: Hopper, S.D., (1978). Progeny trials in an introgressive hybrid population of *Anigozanthos* Labill. (Haemodoraceae) Aust. J. Bot. 26, 309-17.

WILDLIFE OCCASIONAL PAPER NO. 10

TITLE: THE STATUS OF KANGAROOS AND WALLABIES IN AUSTRALIA (1977)

EDITED BY: Andrew A. Burbidge[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A., 6065. Western Australia

ABSTRACT:

Recently, with a world-wide awakening of the need for conservation, there has been much public interest in Australia in the conservation of the native fauna. Much of this interest has been directed towards moves to increase protection of the large kangaroos, especially the Red Kangaroo. Petitions to the Australian Parliament led initially to the setting up of the House of Representatives Select Committee on Wildlife Conservation and more recently to a ban on the export of kangaroo products, even though the Select Committee did not recommend such a ban.

That most public feeling has been directed toward protecting the large kangaroos is a measure partly of their size and status in the Australian landscape; it is also a measure to some degree of the ignorance of the general public regarding which species are actually in danger. The lack of support for conservation programme for many of the smaller species of kangaroos, wallabies and other animals is partly due to people not being able to see these species and identify with them, but it is also due to the lack of authoritative statements as to where real needs lie.

This report is intended to clarify the situation and to state the true position of macropod conservation in Australia.

CONTENTS: 20pp. Colour plates, tables and lists.

CITATION: Burbidge, A.A. (ed.), (1977). The Status of Kangaroos and Wallabies in Australia, Dept. of Environ. Housing and Community Development. (Aust. Govt. Publishing Service, Canberra).

WILDLIFE OCCASIONAL PAPER NO. 11

TITLE: NATURAL HYBRIDIZATION AND MORPHOMETRIC RELATIONSHIPS BETWEEN THREE MALLEE EUCALYPTS IN THE FITZGERALD RIVER NATIONAL PARK, W.A. (1978)

AUTHORS: Stephen D. Hopper[AB], David J. Coates[A] and Allan H. Burbidge[A]

ADDRESSES:

[A]Botany Department, University of Western Australia, Nedlands, WA. 6009.

[B]Present Address: Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

The suspected occurrence of natural hybridization between Eucalyptus preissiana Schau. and E. buprestium F. Muell, near West Mount Barren was investigated through a study of morphometric and reproductive parameters in allopatric and sympatric populations of these species. While E. preissiana and E. buprestium were morphometrically distinct in allopatry, a small number of intermediate individuals occurred in one of the two sympatric populations examined. These intermediates set less fruit per plant than the parental species on average, a fact consistent with the hypothesis that they were hybrids showing partial F_2 breakdown. The demonstration that New Holland honeyeaters (Phylidonyris novae-hollandiae) carried pollen of both parental species in a sympatric population was interpreted as further evidence in support of the occurrence of hybridization.

The possible hybrid status of E. chrysantha Blakely & Steedman was investigated through determining its morphometric relationships in a multivariate analysis of E. sepulcralis F. Muell., E. preissiana and E. buprestium. E. chrysantha was intermediate between E. sepulcralis and E. preissiana, and distinguishable from E. preissiana - E. buprestium hybrids in this analysis.

The taxonomic and evolutionary implications of the study are discussed.

CONTENTS: 15pp. Figures, tables, maps and plates compliment the discussion in the text.

CITATION: Hopper, S.D., Coates, D.J. and Burbidge, A.H. (1978). Natural hybridization and morphometric relations between three mallee eucalypts in the Fitzgerald River National Park, W.A. Aust. J. Bot. 26, 319-33.

WILDLIFE OCCASIONAL PAPER NO. 12

TITLE: ADDITIONS TO THE AVIFAUNA OF THE PRINCE REGENT RIVER NATURE RESERVE (1978)

AUTHORS: P.J. Fuller[A] and A.A. Burbidge[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

In July 1977 we took part in a survey of the status of the Salt-water Crocodile (Crocodylus porosus) in some river systems of the north-west Kimberley. This work was carried out from the University of Sydney's Research Vessel The Harry Messel and the results are reported elsewhere (Messel, et al., 1977).

During the survey we had the opportunity of observing birds which frequent the estuarine portions of the Roe and Prince Regent Rivers and adjacent country included in the Prince Regent River Nature Reserve. Storr et al. (1975) list 134 species of birds recorded in this reserve during an August 1974 survey. We are able to add a further 16 species.

We were in the Roe River on July 23-24 and the Prince Regent on July 26 and 27, 1977.

CONTENTS: 2pp. Bird list of the additional 16 birds sighted during the survey that were not included in previously recorded lists.

CITATION: Fuller, P.J. and Burbidge, A.A., (1978). Additions to the avifauna of the Prince Regent River Nature Reserve. West. Aust. Nat. 14, 42-43.

WILDLIFE OCCASIONAL PAPER NO. 13

TITLE: SEABIRD ISLANDS SAINT ALOUARN ISLAND, WESTERN AUSTRALIA (1978)

AUTHOR: J.A.K. Lane[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

The location, a brief description and ornithological history of St Alouarn Island are given. Notes on the breeding seabirds found on the island are given and factors thought to be affecting breeding are cited.

CONTENTS: 2pp. One map of location and one plate.

CITATION: Lane, J.A.K. (1978). Seabird Islands. St. Alouarn Island, Western Australia. Corella 2, 36-37.

WILDLIFE OCCASIONAL PAPER NO. 14

TITLE: AN EXPERIMENTAL STUDY OF COMPETITIVE INTERFERENCE BETWEEN ANIGOZANTHOS MANGLESII D. DON., A. HUMILIS LINDL. AND THEIR F_1 HYBRIDS (HAEMODORACEAE) (1978)

AUTHOR: Stephen D. Hopper[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, Department of Fisheries and Wildlife, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

Poor competitive ability has been invoked often to explain the confinement of hybrids to disturbed ecotones at the junction of parental habitats. This hypothesis has not as yet been verified in an experimental study. Two-month-old seedlings of Anigozanthos manglesii, A. humilis and synthesized F_1 hybrids were grown singly and in various paired combinations in small pots for 172 days to test for competitive interactions. F_1 hybrids and A. manglesii performed comparably in most competition trials, while A. humilis suffered a considerable competitive disadvantage. It is proposed that competitive interactions may play a minor role in confining naturally occurring F_1 hybrids to ecotonal areas between habitats preferentially occupied by A. humilis and A. manglesii. Spatial limitations on pollen and seed flow appear to be the major factors controlling hybrid distribution in this case.

CONTENTS: 11pp. Tables and plates accompany the discussion of results.

CITATION: Hopper, S.D. (1978). An experimental study of competitive interference between *Anigozanthos manglesii* D. Don., *A. humilis* Lindl. and their F_1 hybrids (Haemodoraceae). Aust. J. Bot. 26, 807-17.

WILDLIFE OCCASIONAL PAPER NO.15

TITLE: ASSORTATIVE POLLINATION BY RED WATTLEBIRDS IN A HYBRID POPULATION OF ANIGOZANTHOS LABILL. (HAEMODORACEAE)(1978)

AUTHORS: Stephen D. Hopper[AB] and Allan H. Burbidge[A]

ADDRESSES:

[A]Botany Department, University of Western Australia Nedlands, W.A. 6009.

[B]Present address: Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

The specificity and spatial pattern of foraging movements of Red Wattlebirds (Anthochaera carunculata Shaw) were studied in a hybrid population of Anigozanthos manglesii D. Don and A. humilis Lindl. in the shire cemetery at Gingin, W.A. Differences in phenology, nectar production, stem height and floral dimensions between F_1 hybrids and the two parental Anigozanthos species were also documented to assess their influence on foraging behaviour and interspecific pollen flow.

The Red Wattlebirds showed a 97% fidelity for A. humilis at its seasonal peak in August 1976 and, a month later, an equally strong fidelity (97%) for A. manglesii at its seasonal peak. Interspecific foraging movements constituted only 1.2% of the total of 925 observed during these two study periods. The spatial distribution of flowering individuals and plant stature appeared to be principal factors determining assortative pollination, presumably because of their influence on the energetics of foraging. It is suggested that the observed nearest-neighbour foraging pattern results in spatial restrictions on pollen flow and may be responsible for the confinement of hybrids to ecotonal zones where the parental species grow intermixed. Gene exchange between species is also restricted by differences in pollen deposition/ retrieval sites arising from the divergent floral structures of A. humilis and A. manglesii.

It is proposed that honeyeaters have generated strong selective pressures influencing the stature, floral structure and phenology of these kangaroo paws.

CONTENTS: 16 pp. Tables, figures and plates are used to expand the discussion of the results in the text.

CITATION: Hopper, S.D. and Burbidge, A.H., (1978). Assortative pollination by Red Wattlebirds in a hybrid population of *Anigozanthos* Labill (Haemodoraceae). Aust. J. Bot. 26, 335-50.

WILDLIFE OCCASIONAL PAPER NO. 16

TITLE: NOMENCLATURE NOTES AND NEW TAXA IN THE CONOSTYLIS ACULEATA GROUP (HAEMODORACEAE) (1978)

AUTHOR: S.D. Hopper[A]

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[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

On the basis of detailed field studies of the Conostylis aculeata R.Br. group and an examination of specimens at the major Australian herbaria (i) C. robusta Diels is reinstated as a species distinct from C. aculeata, (ii) confusion concerning the identity of C. stylidioides F. Muell, is clarified; this species is redescribed and C. prolifera Benth. is reinstated as a distinct species; and (iii) C. aculeata ssp. breviflora ssp. nov. and C. pauciflora sp. nov. are described; both are restricted endemics of the western coastal region of the South West Botanical Province of W.A.

A key to the 7 species now recognized in the C. aculeata group is provided.

CONTENTS: 11pp. Figures, maps and plates of the results of the study are included with the text.

CITATION: Hopper, S.D., (1978). Nomenclature notes and new taxa in *Conostylis aculeata* group (Haemodoraceae). Nuytsia 2, 254-264.

WILDLIFE OCCASIONAL PAPER NO. 17

TITLE: A NEW SPECIES OF ANIGOZANTHOS LABILL. FROM THE MURCHISON RIVER SANDHEATHS OF WESTERN AUSTRALIA (1978)

AUTHOR: S.D. Hopper[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

Anigozanthos kalbarriensis sp. nov. is described and illustrated. It is related to A. humilis Lindl., A. bicolor Endl. and A. gabrielae Domin.

CONTENTS: 3pp. Two plates accompany the text.

CITATION: Hopper, S.D. (1978). A new species of *Anigozanthos* Labill. from the Murchison River sandheaths of Western Australia. Nuytsia 2, 181-183.

WILDLIFE OCCASIONAL PAPER NO. 18

TITLE: THE FLORA AND FAUNA OF DIRK HARTOG ISLAND, WESTERN AUSTRALIA (1978)

AUTHORS: A.A. Burbidge[A] and A.S. George[B]

ADDRESSES:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

[B]Western Australian Herbarium, George Street, South Perth, W.A. 6151.

ABSTRACT:

Dirk Hartog Island (62 000 ha), which lies off Shark Bay, Western Australia, between 25°30'S, and 26°15'S has been visited and studied by a succession of visitors since 1616. It consists of Quaternary Tamala Eolianite which forms rugged cliffs along much of the coast. The rainfall averages 313 mm, falling mostly in winter, while average temperatures range from 11-21°C (winter) to 22-32°C (summer).

There are five vegetation types: tall open-heath; low closed/open-heath with hummock grasses; low very open-heath; hummock grassland; and low open-shrubland. The known indigenous flora totals 258 species in 167 genera of 67 families. Of the named species 77 are South Western, 61 Eremaean and 102 common to both. The island is floristically transitional between the South West and Eremean Botanical Provinces but with a leaning to the South West. Thirty six species, mostly of European origin, have become naturalised.

Two species of macropod marsupials, Lagostrophus fasciatus and Bettongia lesueur, once occurred on Dirk Hartog but are now extinct. Two species of rodents, Pseudomys albocinereus and P. hermannsburgensis are present although not previously reported. Cats, goats and the House Mouse have become feral. Some

84 species of birds have been recorded by a number of visitors over the years. Most have wide-ranging distributions but a few southern species occur here at or near the northern limit of their range. Of special interest is the Black and white Wren (Malurus leucopterus) which is restricted to Dirk Hartog and Barrow Islands. Twenty-seven species of terrestrial reptiles have been collected. Most are typical of the warmer and drier parts of southern-Western Australia.

CONTENTS: 20pp. Maps, plates and tables of results of the study, include exhaustive list of flora, mammals, birds and reptiles.

CITATION: Burbidge, A.A. and George, A.S. (1978). The flora and fauna of Dirk Hartog Island, Western Australia. J. Roy. Soc. West. Aust. 60, 71-90.

WILDLIFE OCCASIONAL PAPER NO. 19

TITLE: THE NUTRITIONAL BIOLOGY OF THE RUMINANTS AND RUMINANT-LIKE MAMMALS - A NEW APPROACH (1978)

AUTHORS: J.E. Kinnear[A] A. Cockson[B], P. Christensen[C] and A.R. Main[B].

ADDRESSES:

[A]West Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, Western Australia, 6065.

[B]Department of Zoology, University of Western Australia, Nedlands, Western Australia, 6009.

[C]Forests Dept., Research Office, Manjimup, Western Australia, 6258.

ABSTRACT:

1. It is widely believed that the forestomach-microbial system of the ruminants and "ruminant-like" mammals (i.e. the mammals with pregastric fermentation - PGF) has evolved to enable these species to utilize (cellulosic) plant materials but there are now however, too many exceptions to this view. This paper attempts to provide a more general explanation of the nutritional biology of PGF.

2. PGF is interpreted in terms of the Hutchinsonian niche. It is shown that the pregastric microbial-mammal symbiosis results in nutritional niche expansion which means that (in agreement with existing knowledge) PGF mammals are capable of satisfying their nutritional requirements from unnutritious foods.

3. The argument is extended to include competitive interactions with non-PGF herbivores where it is demonstrated that PGF mammals are inherently inferior when competing for nutritious food.

4. It is reasoned that in order to avoid the consequences of their competitive inefficiences, PGF mammals must be occupying expanded (unnutritious) nutritional niches which exclude other herbivores with different alimentary systems.

5. Analytical evidence supporting the hypothesis is presented; the evidence is based on dietary analyses and physiological studies on a hitherto unstudied

potorine marsupial. - Bettongia penicillata.

CONTENTS: 9pp. Tables and figures expand textual discussion.

CITATION: Kinnear, J.E., Cockson, A., Christensen, P. and Main, A.R. (1978). The nutritional biology of the ruminants and ruminant-like mammals. A new approach. Comp. Biochem. Physiol. 64, 357-65.

WILDLIFE OCCASIONAL PAPER NO. 20

TITLE: BIOGEOGRAPHICAL ASPECTS OF SPECIATION IN THE SOUTHWEST AUSTRALIAN FLORA (1979)

AUTHOR: Stephen D. Hopper[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

The southwest of the Australian continent is a region of biogeographic interest, having an angiosperm flora remarkably rich in endemic species. It was estimated that 2450 (68%) of the 3600 species known in the region by the mid 1960s were endemics. Recent taxonomic research suggests that the actual level of endemism may approach 75-80%, since southwest genera are being enlarged on average by 10-30% in current monographs.

The central question of the factors responsible for the origin of so many endemic species with the southwest has not yet been addressed in detail. Floristic, biosystematic, paleoclimatic and geomorphic data are synthesised, with particular emphasis on the role of climatic fluctuations and landscape being considered.

CONTENTS: 24pp. Maps, figures and bibliography of cited literature.

CITATION: Hopper, S.D. (1979). Biogeographical aspects of speciation in the southwest Australian flora. Ann. Rev. Ecol. Syst. 10, 399-422.

WILDLIFE OCCASIONAL PAPER NO. 21

TITLE: MAMMALS OF THE WARBURTON REGION, WESTERN AUSTRALIA (1979)

AUTHORS: A.A. Burbidge[A] and P.J. Fuller[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

Interviews with local people, examination of the literature and Museum records and our own field work reveal that 28 species of indigenous mammals have been recorded in modern times from the Warburton Region of arid Western Australia. Only three species of bats have been collected and additional work will doubtless add further species. Five species of exotics have become established. Aboriginal names for most species are given.

Eight species appear to be extinct in the Region - Onychogalea lunata, Lagorchestes hirsutus, Bettongia lesueur, Isoodon auratus, Perameles eremiana, Dasyurus geoffroii, Myrmecobius fasciatus and Leporillus sp. - all of which are intermediate in size between the relatively common larger kangaroos and smaller rodents and dasyurid marsupials. The only intermediate sized marsupials remaining in the region - Petrogale sp., Trichosurus vulpecula and Macrotis lagotis - have declined in numbers.

Reasons for the extinction or decline of so many species are unknown but the establishment of exotic predators is a likely cause. Changes in the extent and frequency of fire may have contributed in some cases.

CONTENTS: 17pp. Map of Warburton region and table of mammals.

CITATION: Burbidge, A.A. and Fuller, P.J. (1978). Mammals of the Warburton Region, Western Australia. Rec. West. Aust. Mus. 8, 57-73.

WILDLIFE OCCASIONAL PAPER NO. 22

TITLE: NICHE THEORY AND MACROPODID NUTRITION (1979)

AUTHORS: J.E. Kinnear[A], and A.R. Main[B]

ADDRESSES:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

[B]Zoology Department, University of W.A., Nedlands, W.A. 6009.

ABSTRACT:

Arid zones are universally acknowledged to be nutritionally hostile environments; this paper sets out to explain the observed capacities of the "ruminant-like" macropodid marsupials to survive in such environments by relating their nutritional biology to the concept of the niche. New insights are achieved by this approach. The nutritional niche is defined as a subset of the Hutchinson niche space; it is shown that the symbiotic interaction between the pregastric microbes and the host mammal enables the host to occupy an expanded nutritional niche. It is predicted that under specific and well-defined conditions, mammals with pregastric fermentation (PGF-i.e. ruminant and ruminant-like species) are competitively inferior to non-PGF herbivores in a nutritional sense, but they avoid the consequences of this competition by occupying expanded nutritional niches which exclude competitors. This nutritional theme of niche expansion common to all mammals with PGF is shown to be nutritionally flexible allowing specialization in the nutritional niche which is more pronounced than external morphology would indicate.

CONTENTS: 10pp. List of references

CITATION: Kinnear, J.E. and Main, A.R. (1979). Niche theory and Macropodid nutrition. J. Roy. Soc. West. Aust. 62, 65-74.

WILDLIFE OCCASIONAL PAPER NO. 23

TITLE: THE HEATHLANDS OF WESTERN AUSTRALIA (1979)

AUTHORS: A.S. George[A], A.J.M. Hopkins[B] and N.G. Marchant[A].

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[A]Western Australian Herbarium, George street, South Perth, W.A. 6151.

[B]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

The heathlands of south-west Australia contribute much towards the high floristic richness and degree endemism for which that area is known. Heathlands are best developed in the broad expanses of sand and laterite in two main areas: Moore River-Shark Bay and Stirling Range-Israleite Bay, although small patches are also distributed throughout the wheatbelt. This vegetation type is also developed on calcareous and granite soils, most commonly in coastal regions. Structural and floristic characteristics are described. Results of a survey of heathlands show most areas very rich in angiosperm plant species. Myratacae and Proteaceae, are particularly important families. Biogeographic and ecological trends are discussed. Detailed descriptions of vegetation and edaphic features at 31 sites throughout the south-west are given.

CONTENTS: 22pp. Maps, tables, plates and figures with bibliography of reference material.

CITATION: George, A.S., Hopkins, A.J.M. and Marchant, N.G. (1979). The Heathlands of Western Australia. In Heathlands and Related Shrublands of the World, A Descriptive Studies. R.L. Specht (ed.). (Amsterdam).

WILDLIFE OCCASIONAL PAPER NO.24

TITLE: POLLEN LOADS ON NEW HOLLAND HONEYEATERS AT QUALUP, WESTERN AUSTRALIA (1979)

AUTHORS: Allan H. Burbidge[A], Stephen D. Hopper[A,B] and David J. Coates[A].

ADDRESSES:

[A]Botany Department, University of Western Australia, Nedlands, W.A. 6009.

[B]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

The composition, quantity and placement of pollen collected from five mist-netted New Holland Honeyeaters (Phylidonyris novaehollandiae) at Qualup, near Bremer Bay in August 1977 was examined. Large amounts of Lambertia inermis pollen were found on all birds, predominantly in crown samples. Substantial quantities of Banksia coccinea and Dryandra cuneata pollen were found in beak samples, together with smaller quantities of Eucalyptus preissiana and E. buprestium grains. These observations suggest that New Holland Honeyeaters are effective pollen vectors and probable pollinators of several flowering plant species at Qualup.

CONTENTS: 3pp. Tables of samplings and short list of references

CITATION: Burbidge, A.H., Hopper, S.D. and Coates, D.J. (1979). Pollen loads on New Holland Honeyeaters at Qualup, Western Australia. West. Aust. Nat. 14, 126-28.

WILDLIFE OCCASIONAL PAPER NO. 25

TITLE: "Nature Reserves in Western Australia"
AUSTRALIA'S 100 YEARS OF NATIONAL PARKS (1979)

AUTHOR: Andrew A. Burbidge[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

Briefly outlines the administration, history, policy on acquisition and considerations on the future of Nature Reserves in Western Australia.

CONTENTS: 3pp. Colour plates of two Nature Reserves in Western Australia.

CITATION: Burbidge, A.A. (1979). Nature Reserves in Western Australia. In "Australia's 100 years of National Parks", Goldstein, W. (ed.). Parks and Wildlife 2, 112-115.

WILDLIFE OCCASIONAL PAPER NO. 26

TITLE: FEEDING BEHAVIOUR OF A PURPLE-CROWNED LORIKEET ON FLOWERS OF EUCALYPTUS BUPRESTIUM (1979)

AUTHORS: Stephen D. Hopper[A] and Andrew A. Burbidge[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

The Purple-crowned Lorikeet Glossopsitta porphyrocephala, a bird distributed throughout temperate and semi-arid areas of south-western and south-eastern Australia (Busby and Davies 1977), is well known for its nomadic wanderings associated with the flowering of species of Eucalyptus (Elliott 1916; Carter 1923; Sedgwick 1940, 1959; Serventy 1948; Ford and Stone 1957; McGill 1959; Bourke 1960; Forshaw 1969; Ford 1971; Cayley and Lendon 1973; Masters and Milhinch 1974; Dell 1977). The staple diet of Purple-crowned Lorikeets has long been assumed to be the nectar of Eucalyptus flowers (e.g. Gould 1865; Barrett 1949; Leach 1958; Cayley 1966; Hill 1967; Forshaw 1969; Holyoak 1973; Cayley and Lendon 1973). However, contents of stomachs examined by Cleland (1912, 1918, 1969) and by Churchill and Christensen (1970; Christensen 1971) have shown that these Lorikeets ingest the pollen of Eucalyptus species, as well as the nectar. Furthermore, Churchill and Christensen (1970; Christensen 1971) proposed that pollen is the principal item of diet for Purple-crowned Lorikeets when feeding on the small flowers of Karri Eucalyptus diversicolor and that nectar alone could not satisfy the daily energy requirements of an average-sized bird. This view, which regards nectar as, at best, a dietary supplement to pollen is now gaining acceptance in standard texts of Australian ornithology (e.g. Serventy and Whittell 1976).

Though Churchill and Christensen (1970) presented sound evidence that Purple-crowned Lorikeets may use pollen as a major nutritional resource the

assertion that these birds could not satisfy their daily energy requirements from nectar alone when feeding on small-flowered eucalypts deserves critical scrutiny. Using data on average nectar flow and pollen production in Karri, Churchill and Christensen (1970) calculated that a fifty-gram Purple-crowned Lorikeet would have to harvest pollen from 300-500 flowers in a day to maintain basal energy metabolism and that 3 000 flowers would have to be visited to do the same using nectar as an energy source. In a twelve-hour day this would entail harvesting pollen at the rate of one flower every 14 seconds. Churchill and Christensen (1970) regarded the latter feeding rate as improbable and hence concluded that the lorikeets could not satisfy their basic daily energy requirements from Karri nectar alone in conditions of average flow. However, no data on feeding rates were given to support this view. Clearly, if Purple-crowned Lorikeets can harvest nectar at a greater rate than one flower each fourteen seconds, then the energetic argument against Karri nectar being an adequate nutritional source would be questionable.

In the present article, we describe observations made at close range on a Purple-crowned Lorikeet that was feeding on Apple Mallee Eucalyptus buprestium, a species with small flowers approximately the same size and shape as those of Karri (Chippendale 1973). We were able to estimate the feeding rate of this bird during these observations and also to see at close quarters the precise behaviour adopted to harvest pollen and nectar.

CONTENTS: 3pp. Short list of references given.

CITATION: Hopper, S.D. and Burbidge, A.A., (1979). Feeding behaviour of a Purple-Crowned Lorikeet on flowers of *Eucalyptus buprestium*. Emu 79, 40-42.

WILDLIFE OCCASIONAL PAPER NO. 27

TITLE: A VANISHING HERITAGE : THE PROBLEM OF ENDANGERED SPECIES AND THEIR HABITAT. (1979)

AUTHOR: Stephen D. Hopper[A]

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[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

There are ca. 6000 described vascular plant species in Western Australia, and an estimated 600-1800 undescribed species. The study of threatened species and plant communities in the State is very much in its infancy. The first attempt to document rare and threatened taxa (in 1974) listed 449 species, a subsequent revision published in 1979 listed 936 species, and a current unpublished study lists in excess of 1000 species as either rare or so poorly collected that their true distribution cannot be estimated. Recent attempts to remedy the dearth of available biogeographical information centre on the commencement of systematic biological surveys and the proposed initiation of an "Atlas of the Western Australian Flora" scheme involving volunteer field recorders. Present information allows for only a speculative consideration of factors threatening the flora. Suggested possibilities include land clearance for agriculture, public utilities, residential development, mining, production forestry and industry, recurrent fire, weed invasion, grazing and trampling by stock, introduced pathogens, clear-felling and woodchipping in forests, commercial harvesting for trade in wildflowers, altered water tables, increasing soil salinity, deleterious effects on pollination caused by European honey bees, and artificial soil enrichment. Directions for future work in Western Australia are outlined.

CONTENTS: 20pp.

CITATION: Hopper, S.D. (1979). A Vanishing Heritage : The Problem of Endangered Species and their Habitat. Read at 49th ANZAAS Conference, Wellington, New Zealand.

WILDLIFE OCCASIONAL PAPER NO. 28

TITLE: A FURTHER MANGROVE KINGFISHER RECORD FROM WESTERN AUSTRALIA (1979)

AUTHORS: N.L. McKenzie[A] and J.K. Rolfe[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, Western Australia 6065.

CONTENTS: 1p. One table.

CITATION: McKenzie, N.L. and Rolfe, J.K. (1979). A Further Mangrove Kingfisher Record from Western Australia. West. Aust. Nat. 14, 159.

WILDLIFE OCCASIONAL PAPER NO. 29

TITLE: POLLEN AND NECTAR FEEDING BY PURPLE-CROWNED LORIKEETS ON EUCALYPTUS OCCIDENTALIS (1979)

AUTHOR: Stephen D. Hopper,[A]

ADDRESS:

[A] Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

CONTENTS: 2pp.

CITATION: Hopper, S.D., (1979). Pollen and Nectar feeding by Purple-Crowned Lorikeets on *Eucalyptus occidentalis*, Emu 80, 239-40.

WILDLIFE OCCASIONAL PAPER NO. 30

TITLE: AUSTRALIAN PLANTS - HYBRIDIZING ANIGOZANTHOS (1979)

AUTHOR: Stephen D. Hopper[A]

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[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

The genus Anigozanthos consists of 11 species of perennial herbs, commonly known as kangaroo paws, which are endemic in south-western Australia. All species appear to be bird-pollinated and produce richly pigmented flowers on stems which range in height from 10-20 cm in A. gabrielae to in excess of 3 m in A. flavidus.

Because of their unusual floral structure and striking colouration, the kangaroo paws have attracted considerable horticultural interest (Beard, 1963, Grieve and Marchant, 1963; Newby, 1970; Oliver, 1971, 1972; Lullfitz 1978). Attempts to bring the species into cultivation have met with varied success. Only A. flavidus has proved to be easy to germinate and grow vigorously in cultivation. Most of the other species are more difficult to germinate and most are relatively short-lived in cultivation, being susceptible to snail attack and a fungal disease known as inkspot.

Although A. flavidus has attractive lemon-yellow flowers, and red, pink and orange individuals occasionally may be found, its colours are no match for the vivid hues of the other species of Anigozanthos. Accordingly, interest has been shown in the hybridization of A. flavidus with other species in the hope that hybrids may be produced which combine the good germination rate, the vigorous foliage and the resistance to snail and fungal attack of A. flavidus with the rich floral colouration of its attractive relatives. In the course of studies on the evolution, ecology and natural hybridization of kangaroo paws (Hopper, 1978) I conducted an extensive

interspecific crossing programme and successfully raised to flowering 39 different kinds of interspecific hybrids. Those which had A. flavidus as one of their parents have proved to be the longest-lived and the most suitable as garden plants. This article aims to compare and contrast the 10 different interspecific hybrids of A. flavidus in terms of their ease of synthesis, germination, pollen fertility and performance in a Perth garden situation.

CONTENTS: 7pp. 2 Colour plates and tables.

CITATION: Hopper, S.D. (1979). Hybridizing Anigozanthos. Australian Plants 10, 211-17.

WILDLIFE OCCASIONAL PAPER NO. 31

TITLE: A VANISHING HERITAGE
ESTABLISHMENT AND MANAGEMENT OF NATURE RESERVES FOR THREATENED VERTEBRATES IN WESTERN AUSTRALIA (1979)

AUTHORS: S.D. Hopper, A.A. Burbidge, A.J.M. Hopkins, J.E. Kinnear, J.A.K. Lane, N.L. McKenzie and R.I.T. Prince.

ADDRESS:

Western Australian Wildlife Research Centre, Department of Fisheries and Wildlife, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

There are ca. 1020 nature reserves and 48 national parks in Western Australia which have been set aside for the conservation of flora and fauna. Due to a lack of detailed biogeographical information on most species of Western Australian animals and plants, the majority of Nature Reserves have been established with the aim of conserving representative portions of ecosystems throughout the State, rather than with the aim of conserving particular threatened taxa. However, biological survey units have been active over the past decade in documenting present distributions. Some vertebrate species previously thought to be rare are now known to be common and not in need of special conservation measures. On the other hand, there are 28 mammals, 34 birds, 7 reptiles and 1 amphibian currently declared rare and/or endangered in Western Australia under the Wildlife Conservation Act. In many instances, recent attempts have been made to acquire nature reserves for the conservation of these endangered species. In the cases of the western swamp tortoise (Pseudemydura umbrina), noisy scrub bird (Atrichornis clamosus), banded hare-wallaby (Lagostrophus fasciatus), woylie (Bettongia penicillata), and black-flanked rock-wallaby (Petrogale penicillata lateralis) research programmes have been implemented to determine the most appropriate management regimes for the reserves on which they occur. Limited work on a few other rare species has been undertaken, but for the majority there is a dearth of adequate biological information, and a clear need for further management-orientated research.

Factors responsible for the decline in vertebrate populations include habitat destruction by man, predation by feral foxes and cats, and habitat disruption through recurrent fire. In the future, continued monitoring and biological surveys, further reserve acquisition, fundamental research and management programmes, and wide publicity on the status of threatened species will be required.

CONTENTS: 20pp. Lists of possibly extinct and rare animals: Western Australia.

CITATION: Hopper, S.D., Burbidge, A.A., Hopkins, A.J.M., Kinnear, J.E., Lane, J.A.K., McKenzie, N.L., and Prince R.I.T. (1979). A Vanishing Heritage. Establishment and Management of Nature Reserves for Threatened Vertebrates in Western Australia. Read at 49th ANZAAS Conference, Wellington, New Zealand.

WILDLIFE OCCASIONAL PAPER NO. 32

TITLE: POLLINATION OF THE RAIN-FOREST TREE SYZGIUM TIERNEYANUM (MYRTACEAE) AT KURANDA, NORTHERN QUEENSLAND. (1980)

AUTHOR: Stephen D. Hopper[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

The identity, abundance and foraging behaviour of the pollinators of the self-compatible mass-flowering tree Syzgium tierneyanum were investigated. Forty-five species of nectarivorous animals were recorded during 4-5 hours of observations at night and 28 hours during the day. Diurnal visitors included seven bird , nine butterfly, four moth (including two hawkmoth) two bee, two ant, one wasp, three blowfly, one fruit fly, two beetle and one weevil species, while nocturnal visitors included one bat and 12 moth (including three hawkmoth) species. Floral dimensions were such that only the vertebrates and larger insect species regularly contacted anther and stigmas while foraging. Of these groups the feral honey bee (Apis mellifera) was the most common flower visitor. Honeyeaters and hawkmoths appeared to be the most important native pollinators; they were abundant in the study area and visited numerous flowers (50-250) in quick succession (103s per flower) on each foraging bout. The only major differences in foraging times observed in the pollinator array were between dirunal, diurnal and crepuscular, and nocturnal floral visitors. Spatial partitioning of the nectar resource was limited to one instance of territoriality involving a Macleay's honeyeater (Meliphaga macleayana) on a densely flowering branch prior to peak blooming time, occasional aggressive chases by honeyeaters, and a division of foraging modes into rapid, erratic flights of 0.5-4 m between flowers (hawkmoths) as against nearest-flower movements (all other groups).

This lack of major spatial partitioning may have been due to the mass flowering of S. tierneyanum and the resultant superabundance of nectar.

The vast majority (ca. 99.95%) of interflower movements observed in foraging bouts of birds (and of hawkmoths) were within the same plant. This suggests that most seeds of S. tierneyanum may be derived from self-pollination.

CONTENTS: 15pp. Tables and figures of results.

CITATION: Hopper, S.D. (1980). Pollination of the Rain-Forest tree *Syzgium tierneyanum* (Myrtaceae) at Kuranda, Northern Queensland. Aust. J. Bot. 28, 223-37.

WILDLIFE OCCASIONAL PAPER NO. 33

TITLE: BIRD AND MAMMAL POLLEN VECTORS IN BANKSIA COMMUNITIES AT CHEYNE BEACH, WESTERN AUSTRALIA (1980)

AUTHOR: Stephen D. Hopper[A]

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[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

A study of several autumn-flowering plants at Cheyne Beach was undertaken to compare pollen loads oftheir bird and mammal vectors and to investigate hypotheses concerning adaptations for bird and mammal pollination in Banksia. New Holland Honeyeaters, White-cheeked Honeyeaters, Western Spinebills and honey possums were all found to carry pollen of species of Banksia, Adenanthos, Lambertia (Proteaceae), Beaufortia and Calothamnus (Myrtaceae), whereas southern bush rats and house mice carried virtually none. Honeyeaters carried significantly larger pollen loads of the Proteaceae species than did honey possums. The honey possums carried the largest loads of Myrtaceae pollen. The loads on honey possums and southern bush rats may have been underestimated because these mammals were live-trapped and may have preened themselves prior to sampling for pollen.

It was found that the two dominant banksias had divergent floral characteristics, some of which previous authors had suggested were adaptations to either bird or mammal pollination (e.g. straight styles in B. baxteri as against hooked styles in B. occidentalis). However, birds and mammals appeared to feed without preference on, and carry the pollen of, both species. The net effect of the divergent characteristics of the two banksias was that B. occidentalis transferred more pollen to vertebrate vectors and set more seed per inflorescence than did B. baxteri. Further work is needed to clarify the functional roles and adaptive significance of floral characteristics in these and other banksias.

CONTENTS: 15pp. Tables and plates of results.

CITATION: Hopper, S.D. (1980). Bird and Mammal Pollen Vectors in *Banksia* Communities at Cheyne Beach, Western Australia. Aust. J. Bot. 28, 69-75.

WILDLIFE OCCASIONAL PAPER NO. 34

TITLE: POLLEN LOADS ON HONEYEATERS IN A GREVILLEA ROGERSONIANA THICKET SOUTH OF SHARK BAY (1980)

AUTHOR: Stephen D. Hopper[A]

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[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

Three Singing Honeyeaters (Meliphaga virescens) and one Spiny-cheeked Honeyeater (Acanthagenys rufogularis) were mist-netted in a Grevillea rogersoniana thicket on Nature Reserve 36127 SW of Cooloomia homestead on September 17, 1979. Pollen loads on both species of honeyeater consisted of large quantities of Diplolaena microcephala grains together with smaller amounts of Grevillea rogersoniana and Banksia ashbyi grains. The honeyeaters appeared to concentrate on G. rogersoniana and, to a lesser extent B. ashbyi, in their foraging for nectar. No feeding on D. microcephala was seen during 60 minutes observation in the early morning peak of feeding activity. The discrepancy between observed honeyeater foraging preferences and the relative proportions of pollen of the three plant species in pollen loads illustrates one of the divergent ways in which plants may compete for service by common pollinators.

CONTENTS: 4pp. Plates and tables of results.

CITATION: Hopper, S.D. (1980). Pollen loads on honeyeaters in a *Grevillea rogersoniana* thicket South of Shark Bay. West. Aust. Nat. 14, 186-89.

WILDLIFE OCCASIONAL PAPER NO. 35

TITLE: TAXONOMY OF NYCTICEIUS GREYII AND N. BALSTONI IN WESTERN AUSTRALIA. (1980).

AUTHOR: N.L. McKenzie[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, Western Australia, 6065.

CONTENTS: 2pp.

CITATION: McKenzie, N.L. (1980). Taxonomy of *Nycticeius greyii* and *N. balstoni* in Western Australia. Aust. Bat. Res. News 15,

WILDLIFE OCCASIONAL PAPER NO. 36

TITLE: CONOSTYLIS NEOCYMOSA SP. NOV. (HAEMODORACEAE) FROM SOUTH-WESTERN AUSTRALIA (1980)

AUTHOR: Stephen D. Hopper[A]

ADDRESS:

[A]Western Australian Wildlife Research Centre, P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

This paper deals with a taxonomic problem arising out of a wider study of the systematics of the Conostylis aculeata R.Br. species group of south-western Australia (Hopper 1977, 1978).

CONTENTS: 4pp. Various plates, tables and maps of results of the study.

CITATION: Hopper, S.D. (1980). *Conostylis neocymosa* sp. nov. (Haemodoraceae) from south-western Australia. Bot. Notiser 133, 223-26.

WILDLIFE OCCASIONAL PAPER NO. 37

TITLE: A BIOSYSTEAMTIC STUDY OF THE KANGAROO PAWS, ANIGOZANTHOS AND MACROPIDIA (HAEMODORACEAE)(1980)

AUTHOR: Stephen D. Hopper[A]

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[A]Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo, W.A. 6065.

ABSTRACT:

Seed set, seed germination and hybrid pollen fertilities following controlled pollinations of 4828 flowers were investigated in the 12 species of kangaroo paws to assess taxonomic and evolutionary relationships, document breeding systems and explore the potential and limitations in synthesizing horticulturally desirable hybrids in the group. All species except Anigozanthos flavidus set few seeds on selfing relative to numbers set on intrapopulational crossing, and thus were predominantly outbreeding. Interpopulational crossing barriers in A. humilis were usually non-existent. In A. viridis they occurred between races in a geographical pattern consistent with the occurrence of the Wallace Effect (reproductive character displacement). In A. bicolor they were complex and generally uncorrelated with interpopulational distances or morphological (racial) divergence, while in A. manglesii they were associated consistently with racial differences.

Interspecific crosses involving 79 species combinations and 215 population combinations invariably revealed crossing barriers more potent than those in intraspecific crosses. The biosystematic data support the taxonomic conclusions that Anigozanthos and Macropidia are genetically isolated genera, that recognition of just two sections (Anigozanthos and Haplanthesis) represents the best subgeneric classification of Anigozanthos and that members of the A. bicolor - A. gabrielea - A. viridis, A. humilis - A. kalbarriensis and A. rufus - A. pulcherrimus groups each constitute distinct species rather than intraspecific taxa. The

majority of interspecific F_1 hybrids were found to succumb to fungal attack, snail predation and/or inappropriate watering within 2 or 3 years of cultivation. Hybrids of A. flavidus appeared to be the most vigorous, long-lived and floriferous, and probably are the most suitable for large-scale horticultural development.

CONTENTS: 21pp. Tables of results.

CITATION: Hopper, S.D. (1980). A Biosystematic Study of the Kangaroo Paws, *Anigozanthos* and *Macropidia* (Haemodoraceae). Aust. J. Bot. 28, 659-80.