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Herpetofauna of the Geraldton Region, Western Australia

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Abstract

The study area is located on the west coast of Western Australia approximately between latitudes 28° and 30°S; it extends for 30-50 km inland to about Ajana, Eradu, Strawberry and Eneabba, and for 50-70 km offshore to the Houtman Abrolhos. The climate ranges from semi-arid in the north to subhumid in the south, most of the rain falling in the cooler half of the year. Much of the land outside reserves has been cleared for farming. Brief notes are given on the local distribution, relative abundance and habitat preferences of the 96 species of frogs, turtles, lizards and snakes recorded from the region. Some aspects of regional zoogeography are discussed.

Introduction

The present paper is one of several dealing with the herpetofauna of the west coast of Western Australia. To the immediate north of the present region L.A. Smith (pers. comm.) has studied the herpetofauna of the Kalbarri National Park, and Storr and Harold (1980) that of the Zuytdorp area; to the immediate south Dell and Chapman (1977) listed the amphibians and reptiles of the Cockleshell Gully Reserve; and to the east Burbidge *et al.* (1978) described the fauna of the Wandana Nature Reserve near Yuna.

Published information on the herpetofauna of the present region hitherto covered only the Houtman Abrolhos (Alexander 1922, Green 1972, O'Loughlin 1965, 1966 and 1969, and Storr 1960 and 1965) and the islands further south (Ford 1963). However, much information on the mainland was available in the registers of the Western Australian Museum, for the farming country between Northampton and Dongara has yielded many specimens since the turn of the century.[1] More recently naturalists have explored the sandplains, wetlands and

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[1] A collection (WAM R26304-26355) said to have been made by F.W. Pearson at Greenough between 1851 and 1881 is now believed to have come from the Eastern Goldfields.

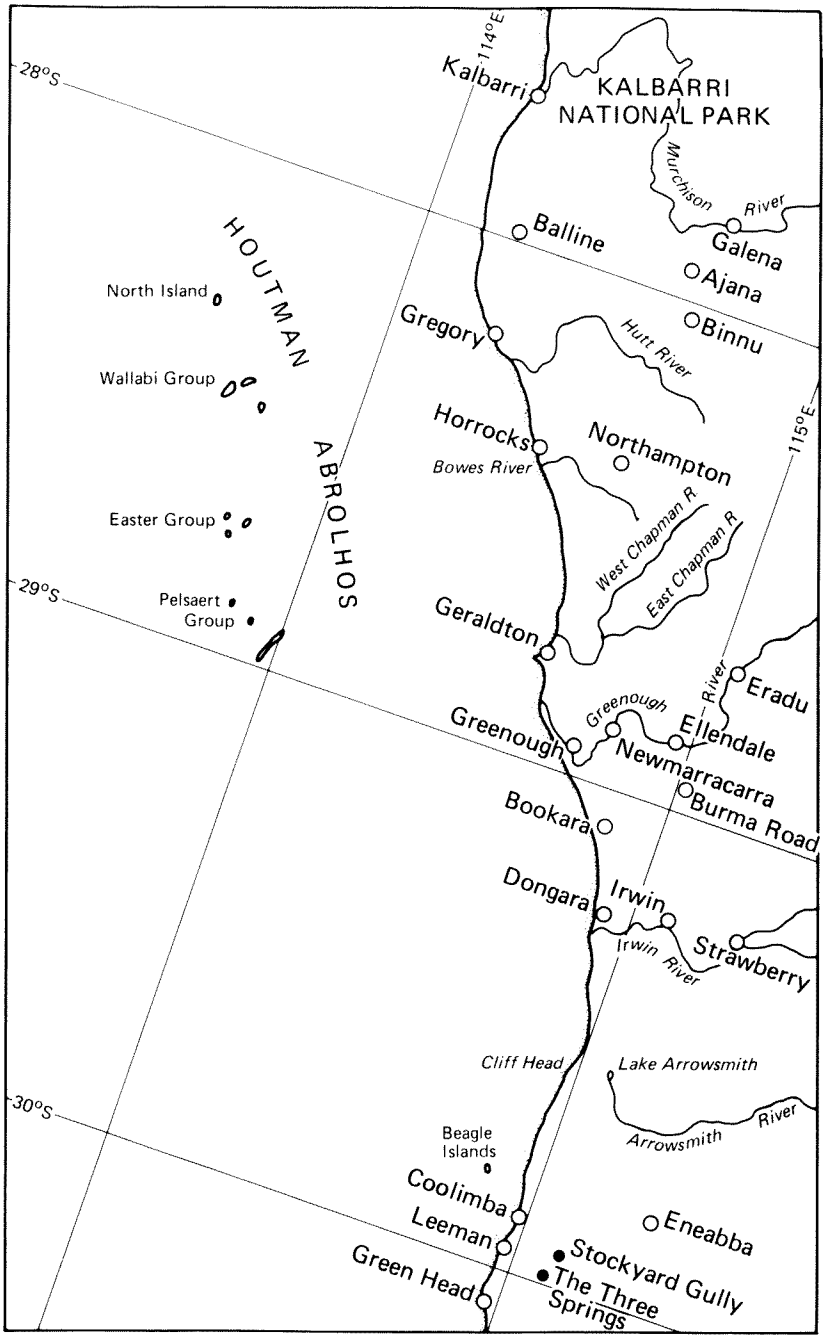

Figure 1 Map of Geraldton region, Western Australia.

caves of the region (Figure 1). To these data we have added those gathered by T.M.S. Hanlon in December 1980 and J.N. Dunlop in April 1982; the expenses of these surveys were met by generous grants from Mr and Mrs W.H. Butler to the Western Australian Museum.

The Environment

Mean annual rainfall ranges from 32 cm in the north-east to 65 cm in the far south, 73-81% of it falling from May to September. Along the mainland coast, and still more in the Houtman Abrolhos, the climate is mild. In the interior summers are much hotter (mean daily maximum temperature *c.* 35°C in January and February), and frosts are occasionally reported in winter.

The south and far north of the region consist essentially of a low sandy plateau rising gradually to 200-250 m in the east and terminating in the west in coastal dunes or low cliffs of aeolian limestone. The central and lower northern parts of the region are dissected by the Bowes, Chapman, Greenough and Irwin Rivers, and the sandy plateau has been reduced to remnants on the mesas between Geraldton and Northampton and to a much larger area between the Chapman and Greenough Rivers east of the 'Greenough Flats'. The valleys of these rivers, especially their alluvial plains, have long been cleared for farming. In this central sector, unconsolidated white sand dunes stand between the red-soil plains and the sea.

The sandy plateaux carry a rich assemblage of shrubs with scattered low trees of *Banksia, Eucalyptus, Xylomelum, Nuytsia* etc. In the dissected areas of the north-east, thickets of jam (*Acacia acuminata*) and scattered York gums (*Eucalyptus loxophleba*) occupy or used to occupy the undulating country below the residual sandplains; here the soils are generally heavy and often stony. Watercourses and lagoons are fringed with woodlands of *Eucalyptus camaldulensis* (replaced by *E. rudis* in the far south) and *Casuarina obesa* and thickets of *Melaleuca.* The seaward slopes of coastal dunes are sparsely covered with *Spinifex longifolius* and low shrubs; with increasing shelter from the sea the dunes support a higher and more varied heathland and thickets of *Acacia* (especially *A. rostellifera*) and *Melaleuca.*

The numerous islands of the Houtman Abrolhos are low-lying and consist largely of flats of marine limestone and piles of debris thrown up by storms from the fringing coral reefs. Only the largest of the northern islands (North, East Wallabi and West Wallabi) contain extensive areas of sandy beaches and dunes. On most of the islands the vegetation is sparse and the flora depauperate, but parts of East and West Wallabi are clothed in moderately rich scrub. There is no fresh surface water on any of the islands. The surrounding seas are considerably warmer than those along the mainland coast.

For further information on the physiography, soils and vegetation of the region see Beard (1976). In the following list specimens in the R series of the Western Australian Museum are cited without prefix.

Annotated List

Leptodactylidae

Heleioporus albopunctatus Gray, 1841

Throughout the mainland, wherever fresh surface water is available in winter and early spring (collected on the Hutt, Bowes, Chapman, Greenough and Irwin Rivers and at White Peak and Stockyard Gully). Begins to call in late April.

Heleioporus eyrei (Gray, 1845)

Near-coastal areas north to the lower Greenough (collected at Greenough, 12 km E of Dongara 12 km E of Irwin, 16 km E of Coolimba and the Three Springs[2]). Uncommon. Swamps that fill in late autumn or early winter.

Heleioporus psammophilus Lee and Main, 1954

One record from the lower Irwin River: three specimens (30516, 30527, 32993) collected at 2 km E of Irwin.

Limnodynastes dorsalis (Gray, 1841)

Throughout the mainland (collected on the Hutt River at 12 km ESE of Gregory, the Bowes River at 12 km W of Northampton, the Chapman River, the Irwin River at Mountain Bridge, and at the Three Springs, and heard at 2 km N of Northampton and at Lake Arrowsmith).

Myobatrachus gouldii (Gray, 1841)

One record from the eastern interior: a specimen collected under a stone in sandplain country at Eradu (Harrison 1927).

Neobatrachus pelobatoides (Werner, 1914)

Probably occurring throughout the mainland, but there is only one record, a specimen (8593) collected at White Peak. There are several records from immediately north and immediately south of our region.

Neobatrachus sp.

Two frogs (12479-80) collected at Greenough were registered in June 1957 as *'Heleioporus centralis'*. These specimens cannot be found for checking, but they were more likely to belong to *Neobatrachus sutor* Main (only then being described) than to *N. centralis* (Parker). *N. sutor* has been collected just north of our region at Galena on the Murchison River.

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[2] The soak Three Springs is referred to in this paper as 'the Three Springs' to distinguish it from the town of Three Springs to the east of our area.

Pseudophryne guentheri Boulenger, 1882

Throughout the mainland (collected on the Hutt River north of Northampton, the Chapman River, the Greenough River at Ellendale and Newmarracarra, and the Irwin River, and at Stockyard Gully and the Three Springs). Moderately common. Requiring fresh surface water in late autumn and winter.

Ranidella pseudinsignifera (Main, 1957)

Throughout the mainland (collected at East Chapman, Bookara, Pell Bridge on the lower Irwin River, and Stockyard Gully, and heard at the Three Springs). Moderately common. Requiring fresh surface water in winter.

Hylidae

Litoria moorei (Copland, 1957)

Greater part of mainland, north to the Hutt River (collected on the Hutt River at 12 km ESE of Gregory, on the Bowes River at 12 km W of Northampton, at an 'un-named cave near Eneabba', and at Stockyard Gully and the Three Springs, and observed at Ellendale Pool on the Greenough River). Common. Requiring permanent freshwater river-pools or springs.

Cheloniidae

Chelonia mydas (Linnaeus, 1758)

Common summer visitor to North I., Houtman Abrolhos, where it is said to nest (Storr 1960). Also recorded by Alexander (1922) from West Wallabi I.

Eretmochelys imbricata (Linnaeus, 1766)

A specimen was received from Geraldton in 1902.

Gekkonidae

Crenadactylus ocellatus ocellatus (Gray, 1845)

Regionally confined to the Houtman Abrolhos. In the Wallabi Group uncommon on the larger islands (East Wallabi and West Wallabi) and moderately common on the smaller islands (Seagull and Tattler); in the Easter Group common on Rat, Hut and Helsinki Is; and in the Pelsaert Group common on Middle I. Sheltering under limestone rocks and reef debris.

Diplodactylus alboguttatus Werner, 1910

Two records: a specimen in the Museum of Comparative Zoology (Harvard) from Geraldton and one in the WAM from 4 km S of Geraldton. Common in the lateritic country immediately south of our region (Dell and Chapman 1977).

Diplodactylus granariensis Storr, 1979

One record: three specimens (27397-9) collected at 12 km E of the mouth of the Hutt River. Moderately common in the lateritic uplands immediately south of our region.

Diplodactylus ornatus Gray, 1845

Coastal and near-coastal areas throughout the mainland. Uncommon. Has been collected in *Acacia rostellifera* thickets in white coastal dunes, in *Melaleuca-Acacia* scrub on near-coastal grey loamy sand, and in *Xylomelum-Banksia* scrub on inland sandplains.

Diplodactylus polyophthalmus Günther, 1867

One record from far south: a specimen (78106) collected in sandplain close to a lateritic ridge 10 km S of Eneabba.

Diplodactylus pulcher (Steindachner, 1870)

Two records of single specimens from far north-east (Ajana and Eradu).

Diplodactylus spinigerus Gray, 1842

Common on all coasts, including East Wallabi and West Wallabi Is in the Houtman Abrolhos, in thickets of *Acacia rostellifera,* open *Spinifex longifolius* and *Olearia axillaris,* and scrubs of *Melaleuca, Acacia* and *Casuarina.* Also common on inland sandplains from Binnu south to Eneabba.

Diplodactylus squarrosus Kluge, 1962

One record from far north-east: a specimen (24851) collected at Binnu.

Diplodactylus strophurus (Duméril and Bibron, 1836)

One record from far north-east: a specimen (26006) collected at Binnu.

Gehyra variegata (Duméril and Bibron, 1836)

Throughout the mainland and on some of the Houtman Abrolhos (East Wallabi and West Wallabi Is in the Wallabi Group, and Murray and Middle Is in the Pelsaert Group). Very common on the mainland in a wide variety of habitats; very common on Middle I. (O'Loughlin 1969); scarce on other islands.

Heteronotia binoei (Gray, 1845)

Northern half of mainland south to Greenough; also North and West Wallabi Is in the Houtman Abrolhos. Common on North I. and locally on the mainland but generally uncommon. A wide variety of habitats including coastal limestone.

Nephrurus levis occidentalis Storr, 1963

Northern half of mainland south to Waggrakine and Wicherina. Rare. White sandplains with relatively open vegetation.

Phyllodactylus marmoratus (Gray, 1845)

On numerous islands in the Houtman Abrolhos: North I.; East Wallabi, West Wallabi, Tattler, Pelican and Seagull Is and islet between Seagull and East Wallabi Is in the Wallabi Group; Rat, Helsinki, Morley and Wooded Is in the Easter Group; and Gun I., three islets south of Gun I., and Murray, Shark, Basile and Pelsaert Is in the Pelsaert Group. Very common on Pelican, Tattler, Wooded, Gun and Murray Is and south end of Pelsaert I.; scarce to moderately common on other islands. Sheltering under limestone and reef debris. Occurs on the mainland just south of our region (Cockleshell Gully).

Phyllurus milii (Bory, 1825)

Sparsely distributed on the mainland (collected on coast at Horrocks and Geraldton and near Greenough, and in the interior at a Stockyard Gully cave). Also the Houtman Abrolhos: East Wallabi, West Wallabi, Seagull and Pigeon Is in the Wallabi Group; and Gun I. in the Pelsaert Group. Very common on the islands; scarce on the mainland. Marine and aeolian limestone, including caves and sea-cliffs on the mainland.

Pygopodidae

Aclys concinna Kluge, 1974

One record from far south-west: a specimen (72983) found dead on road through scrubby heath on whitish sand over limestone 5 km E of Coolimba.

Aprasia repens Fry, 1914

Southern and central interiors, north to Eradu. Scarce. Sandplains.

Delma australis Kluge, 1974

Regionally known only from Rat I. in the Easter Group, Houtman Abrolhos, where it is common under slabs of limestone. In Western Australia mainly distributed east of the Darling Range; on the west-coastal mainland only found in the country immediately south of Shark Bay.

Delma fraseri Gray, 1831

Greater part of mainland north to Northampton. Uncommon.

Delma grayii Smith, 1849

Southern part of mainland north to Beagle Point and inland to Eneabba; also West Wallabi I. in the Houtman Abrolhos; the specimen of *'Delma fraseri'* from East Wallabi I. (O'Loughlin 1966: 22) probably belonged to this species. Scarce. Coastal dunes and near-coastal sandplains.

Delma nasuta Kluge, 1974

One record from north-east: a specimen (47709) collected at Northampton.

Delma tincta DeVis, 1888

Northern interior south to East Chapman and Eradu. Moderately common. Mainly on heavy red soils carrying jam (*Acacia acuminata*).

Lialis burtonis Gray, 1835

Throughout the mainland; also East Wallabi and West Wallabi Is in the Houtman Abrolhos. Moderately common. A wide variety of habitats but preferring coastal dunes and limestone.

Pletholax gracilis gracilis Cope, 1864

One record from southern interior: a specimen (25071) collected at Eneabba.

Pygopus lepidopodus (Lacépède, 1804)

Throughout the mainland. Moderately common. A wide variety of habitats including near-coastal sandplains.

Pygopus nigriceps nigriceps (Fischer, 1882)

Northern interior south to the Irwin River. Known only from single specimens collected at Ajana, Binnu and Irwin. Probably restricted to heavier soils.

Agamidae

Amphibolurus adelaidensis adelaidensis (Gray, 1841)

Throughout the mainland. Common. Sandplains with heath or mallee scrub.

Amphibolurus inermis (DeVis, 1888)

Apparently confined to two discrete areas: the far north-west around Balline, and the upper south-west between Dongara and Lake Arrowsmith. Uncommon. Lightly vegetated sandy loams.

Amphibolurus maculatus maculatus (Gray, 1831)

Mainly in the south (north to Cliff Head), where it is common on sandplains. Further north largely restricted to the white coastal dunes between Dongara and Geraldton and again at Gregory, where it is moderately common among *Spinifex longifolius*; there is also a specimen from Ajana. A little east of our region, e.g. at 31 km E of Eneabba it is replaced by *A. m. griseus* Storr.

Amphibolurus minor minimus Loveridge, 1933

Endemic to the Houtman Abrolhos (North, East Wallabi and West Wallabi Is). Very common in all vegetated habitats but favouring sandy areas with clumps of

Spinifex longifolius; also among low halophytic shrubs on shell grit and in open mixed scrub on limestone. This subspecies differs from *A. m. minor* in its lesser size and relatively longer tail and hindlegs (Storr 1965: 8).

Amphibolurus minor minor Sternfeld, 1919

Mainly southern, north nearly to Geraldton, extending inland in south, but north of Dongara confined to coastal dunes. Also far north-east (single specimens from Ajana and Binnu). Common in south, where it is found in a variety of habitats including *Acacia rostellifera* thickets in white coastal dunes, low coastal heaths, mallee scrubs on grey sandy loam, and the rich proteaceous heaths of interior sandplains. In the southern population the mouth is yellow; mouth colour has not been recorded in the north-east, but to the immediate north of our region (Murchison House) it has been noted as white.

Amphibolurus reticulatus (Gray, 1845)

Northern, south to Waggrakine and Eradu, mainly in the interior but following the Hutt, Bowes and Chapman Rivers downstream nearly to their mouths. Moderately common. Preferring the heavier soils.

Lophognathus longirostris Boulenger, 1883

Regionally confined to the Greenough River. Common. Mainly the woodlands of *Eucalyptus camaldulensis* and scrubs of *Melaleuca-Casuarina* along the banks of the river.

Moloch horridus Gray, 1841

Patchily in interior (24 km W of Binnu, Eradu, Mt Fanny and Eneabba). Locally common but generally scarce. Heath on sand or laterite.

Scincidae

Cryptoblepharus carnabyi Storr, 1976

Regionally confined to the Houtman Abrolhos: East Wallabi and West Wallabi Is and islet between East Wallabi and Seagull Is in the Wallabi Group; Rat, Helsinki and Morley Is in the Easter Group; and Gun I., an islet south of Gun I., and Shark I. in the Pelsaert Group. (Specimens of *'Ablepharus boutonii'* from Seagull, Pigeon, Hut and Pelsaert Is no doubt belong to *C. carnabyi* but are not available for checking.) Locally common in the Easter and Pelsaert Groups but uncommon in the Wallabi Group. These skinks are wholly terrestrial, sheltering in limestone crevices and under reef debris. On the mainland found along the Murchison River just north of our region.

Cryptoblepharus plagiocephalus (Cocteau, 1836)

Northern interior south to the Greenough River, and southern interior north

to Lake Arramall (30 km SSE of Dongara). Uncommon. Mainly trees along watercourses and around lagoons, especially *Eucalyptus rudis* in south.

Ctenotus fallens Storr, 1974

Southern half of mainland north to Arramall Farm (30 km SSE of Dongara) and inland to Eneabba; and the Houtman Abrolhos (North I.; East Wallabi, West Wallabi and Seagull Is in the Wallabi Group; Rat, Hut and Helsinki Is in the Easter Group; and Middle I. in the Pelsaert Group). Common. Open or lightly wooded sandplains, coastal dunes and coastal limestone. Has been collected in the Kalbarri National Park to the immediate north of our region.

Ctenotus impar Storr, 1969

Two records from southern interior: five specimens from Burma Road Reserve (28°55'S, 115°01'E) and two from 10 km S of Eneabba. Locally common. Sandplains. One specimen was taken from a scorpion burrow.

Ctenotus lesueurii (Duméril and Bibron, 1839)

Two records: a specimen (41658) from coastal dunes near the lower Greenough River, and one (72985) from a yellowish sandplain 15 km E of Coolimba.

Ctenotus mimetes Storr, 1969

One record from extreme north-east: a specimen (30321) collected at 3 km W of Ajana.

Ctenotus pantherinus pantherinus (Peters, 1866)

Patchily in interior (Binnu, 32 km N of Eneabba and 10 km S of Eneabba). Scarce. Heath on laterite and nearby sandplains.

Ctenotus schomburgkii (Peters, 1863)

Patchily in interior (Burma Road Reserve, 5 km SSE of Eneabba and 10 km S of Eneabba). Scarce. Sandplains.

Egernia kingii (Gray, 1839)

Mainland coast north to the Hutt River, and the Houtman Abrolhos (North I.; East Wallabi, West Wallabi, Tattler, Seagull and Pigeon Is in the Wallabi Group; and Murray, Middle and Pelsaert Is and islet south of Gun I. in the Pelsaert Group). Scarce on the mainland; moderately common to very common on the islands. Coastal dunes, cliffs and flats of broken limestone and reef debris, especially in vicinity of nesting terns.

Egernia multiscutata bos Storr, 1960

Three records from far south; a specimen (26746) collected at Stockyard Gully,

and observations by G.M. Storr on *Eucalyptus todtiana* sandplains 13 km SW and 31 km E of Eneabba.

Egernia stokesii stokesii (Gray, 1845)

Endemic to the Houtman Abrolhos: East Wallabi, West Wallabi, Tattler, Seagull and Pigeon Is in the Wallabi Group; and Murray and Middle Is in the Pelsaert Group; formerly occurring on Rat I. in the Easter Group, but disappearing between 1889 and 1913, following the introduction of domestic cats (Alexander 1922). Very common. Sheltering mainly under slabs of limestone; also in hollow stems of dead shrubs.

Eremiascincus richardsonii (Gray, 1845)

Northern interior south to White Peak. Rare. Favouring the heavier soils.

Lerista christinae Storr, 1979

One record from southern interior: a specimen (70721) pit-trapped in rich proteaceous heathland 5 km SSE of Eneabba.

Lerista distinguenda (Werner, 1910)

On the mainland regionally confined to the valley of the Greenough River (collected at Eradu, Newmarracarra and Greenough); also Rat I. in the Easter Group, Houtman Abrolhos. Uncommon.

Lerista elegans (Gray, 1845)

Far south of mainland north to 16 km N of Eneabba, and East Wallabi and West Wallabi Is in the Houtman Abrolhos. Uncommon. Sandy country with low open vegetation.

Lerista gerrardii (Gray, 1864)

Northern interior south to the Greenough River (Newmarracarra). Mainly in leaf litter beneath acacias, especially jam (*A. acuminata*), on red loamy soils.

Lerista greeri Storr, 1982

A specimen (188) was collected by W.B. Alexander in the Wallabi Group, Houtman Abrolhos, in November 1913. Otherwise this skink is only known from the Kimberley.

Lerista lineopunctulata (Duméril and Bibron, 1839)

Greater part of mainland, inland to Northampton and Eradu; and West Wallabi I. in the Houtman Abrolhos. Moderately common in white coastal dunes; scarce on sandplains of interior.

Lerista macropisthopus (Werner, 1903)

Extreme north-east (Ajana and Galena). Moderately common. Mainly in leaf litter beneath acacias growing on red loamy soils.

Lerista planiventralis decora Storr, 1978

One record from southern interior: two specimens (73112-3) collected in white sand with heath and scattered eucalypts 16 km N of Eneabba.

Lerista praepedita (Boulenger, 1877)

Greater part of mainland, inland to Eradu and Eneabba; and the Houtman Abrolhos (North I.; East Wallabi and West Wallabi Is in the Wallabi Group; and Middle I. in the Pelsaert Group). Uncommon. Sandplains.

Menetia greyii Gray, 1845

Sparsely distributed on the mainland (collected at Binnu, 6 km E of Dongara and 16 km E of Coolimba); and the Houtman Abrolhos (Eastern I. in the Wallabi Group, and Leo, Suomi, Rat and Morley Is in the Easter Group). Scarce on the mainland; common on the islands.

Menetia surda Storr, 1976

One record from far north-east: a specimen (71048) collected under litter on a yellow sandplain 4 km N of Binnu.

Morethia butleri (Storr, 1963)

One record from the northern interior: a specimen (28003) collected at 12 km E of the mouth of the Hutt River.

Morethia lineoocellata (Duméril and Bibron, 1839)

Northern and central coasts south to the vicinity of Greenough; and North, East Wallabi and West Wallabi Is in the Houtman Abrolhos. Common. Well-vegetated, white coastal dunes.

Morethia obscura Storr, 1973

Sparsely distributed in the interior (collected at Northampton, Burma Road Reserve, 10 km S of Eneabba and 15 km E of Coolimba); also Gun I., an islet south of Gun I., and Pelsaert I. in the Pelsaert Group, Houtman Abrolhos, and possibly the Beagle Is (Ford 1963: 138). Rare on the mainland; common in the Pelsaert Group.

Omolepida branchialis (Günther, 1867)

Common in far south-west, north to Beagle Point and inland to Stockyard Gully, in white coastal dunes and near-coastal sandplains. Scarce further north (collected at Galena, 'presumably Geraldton' and Newmarracarra).

Tiliqua occipitalis (Peters, 1863)

Coastal areas throughout the mainland, inland to Balline and Lake Arrowsmith. Moderately common. Mainly well-vegetated coastal dunes and near-coastal sandplains; also observed on a saltbush flat.

Tiliqua rugosa rugosa (Gray, 1827)

Throughout the mainland. Moderately common in farming country and near coast; scarce in uncleared parts of the interior.

Varanidae

Varanus caudolineatus Boulenger, 1885

Extreme north-east (two specimens from Ajana).

Varanus gouldii (Gray, 1838)

Sparsely distributed throughout the mainland. Preferring sandy country.

Varanus tristis tristis (Schlegel, 1839)

Two records: a specimen (1735) collected at Newmarracarra, and one observed by T.M.S. Hanlon in *Acacia* scrub 5 km N of Leeman.

Typhlopidae

Ramphotyphlops australis (Gray, 1845)

Two records from southern interior: single specimens collected at Irwin House (5688) and Arrowsmith (21856).

Ramphotyphlops hamatus Storr, 1981

Two records from northern half of mainland: single specimens from Geraldton (32368) and Newmarracarra (1733).

Ramphotyphlops leptosoma Robb, 1972

Northern interior south to Newmarracarra. Moderately common. Apparently favouring the heavier soils.

Ramphotyphlops waitii (Boulenger, 1895)

Five of the six regional specimens come from the vicinity of Geraldton (including Wonthella and Greenough); the sixth is from the southern interior (2 km N of Eneabba Spring). [The specimen of *'Typhlina bituberculata'* reported by Storr and Harold (1980) for the Zuytdorp area was in fact an *R. waitii*.]

Boidae

Aspidites ramsayi (Macleay, 1882)

Northern interior south to Newmarracarra. Scarce. One specimen was found in a rabbit warren in sandplain country at Eradu.

Liasis 'childreni' Gray, 1842

Three records: single specimens from 30 km N of Geraldton (76412), Moonyoonooka (6142) and 5 km E of Coolimba (72984).

Python spilotus imbricatus L.A. Smith, 1981

Coastal areas of mainland north to Geraldton; and East Wallabi, West Wallabi and Seagull Is in the Wallabi Group, Houtman Abrolhos. Scarce on the mainland; common on the Wallabi Is; formerly occurring on North I. (Storr 1960).

Elapidae

Demansia reticulata reticulata (Gray, 1842)

Throughout the mainland. Moderately common. A specimen from Bookara had swallowed a frog (*Pseudophryne guentheri*).

Denisonia gouldii (Gray, 1841)

One record from far southern interior: three specimens (28087-9) collected at Stockyard Gully Cave.

Denisonia monachus Storr, 1964

Northern half of mainland south to the Greenough River (Newmarracarra). Uncommon.

Notechis curtus (Schlegel, 1837)

Far south of mainland north to the lower Arrowsmith River. Uncommon. Sandplains and coastal dunes.

Pseudechis australis (Gray, 1842)

Throughout the mainland. Moderately common in the interior; scarce or absent near the coast.

Pseudonaja modesta (Günther, 1872)

Northern interior south to the Greenough River (Walkaway). Uncommon.

Pseudonaja nuchalis (Günther, 1858

Throughout the mainland. Very common in and around towns and settlements; moderately common in coastal dunes; apparently uncommon in uncleared parts of the interior.

Vermicella bertholdi (Jan, 1858)

Southern interior north to the Greenough River (Newmarracarra). Scarce.

Vermicella bimaculata (Duméril, Bibron and Duméril, 1854)

One record from far south: a specimen (72971) collected at 10 km N of Leeman. The specimens from 'Greenough' (cited by Storr 1967: 86) are now believed to have come from the Eastern Goldfields.

Vermicella fasciolata fasciolata (Günther, 1872)

One record from extreme south-west: a specimen (62262) collected at 10 km N of Green Head.

Vermicella littoralis Storr, 1968

Coastal dunes and limestone north to Horrocks; and East Wallabi and West Wallabi Is in the Houtman Abrolhos. Moderately common.

Vermicella semifasciata semifasciata (Günther, 1863)

Northern half of mainland south to Geraldton. Moderately common.

Hydrophiidae

Pelamis platura (Linnaeus, 1766)

One record: a specimen (29609) found on the beach at Dongara after a storm in early October 1967.

Discussion

The 46 genera and 97 species and subspecies of amphibians and reptiles are distributed in 12 families as follows:

Leptodactylidae	6 genera, 9 species
Hylidae	1 genus, 1 species
Cheloniidae	2 genera, 2 species
Gekkonidae	7 genera, 14 species
Pygopodidae	6 genera, 11 species
Agamidae	3 genera, 8 species and subspecies
Scincidae	9 genera, 29 species
Varanidae	1 genus, 3 species
Typhlopidae	1 genus, 4 species
Boidae	3 genera, 3 species
Elapidae	6 genera, 12 species
Hydrophiidae	1 genus, 1 species

In view of the number of species regionally known from only one or two records, we expect several more reptiles to be added to the list. These additional species are most likely to be among those recorded from the area immediately north of our region, viz. *Aprasia smithi, Amphibolurus parviceps, A. scutulatus, Ctenotus severus, Lerista connivens, L. humphriesi, L. muelleri, L. 'nicholsi'* and *Varanus eremius.*

Species recorded from the immediate south are less likely to be found in our area, for their habitat (lateritic uplands with dry sclerophyll forest) ceases just before our region is reached; in this category are *Egernia napoleonis* and the mainland population of *Crenadactylus o. ocellatus.* Two species, *Chelodina oblonga* and *Notechis scutatus,* have their northern limit on the Hill River, and *Hemiergis peronii quadrilineata* extends north to Jurien Bay.

Nevertheless many south-west Australian frogs and lizards extend into the present region, eleven of them attaining their northern limit here, viz.:

Heleioporus eyrei (north to the lower Greenough)
H. psammophilus (to the lower Irwin)
Litoria moorei (to the lower Hutt)
Aprasia repens (to Geraldton)
Diplodactylus polyophthalmus (to Eneabba)
Pletholax g. gracilis (to Eneabba)
Ctenotus impar (to the Burma Road Reserve)
Egernia kingii (to the lower Hutt on the mainland; to North I. in the Houtman Abrolhos) and
Lerista christinae (to Eneabba)
Lerista distinguenda (to Greenough on the mainland; to Rat I. in the Houtman Abrolhos) and
Python spilotus imbricatus (to Geraldton on the mainland; to North I. in the Houtman Abrolhos)

To these could be added *Egernia multiscutata bos,* which extends only to Eneabba on the mainland but reappears much further north on Bernier I. in Shark Bay.

An even larger number of arid-zone reptiles have their southern limit (at least on the west coast or in its vicinity) within the present region:

Diplodactylus squarrosus (extending south to Binnu)
Diplodactylus strophurus (to Binnu)
Nephrurus levis occidentalis (to the hinterland of Geraldton)
Delma nasuta (to Northampton)
Delma tincta (to East Chapman)
Pygopus n. nigriceps (to the lower Irwin)
Amphibolurus inermis (to Lake Arrowsmith)
Amphibolurus reticulatus (nearly to Geraldton)
Moloch horridus (to Eneabba)

Ctenotus mimetes (to Ajana)
Ctenotus schomburgkii (to Eneabba)
Lerista gerrardii (to the Greenough)
Lerista macropisthopus (to Ajana)
Menetia surda (to Binnu)
Morethia butleri (to the Hutt)
Varanus caudolineatus (to Ajana)
Ramphotyphlops hamatus (to the Greenough)
Ramphotyphlops leptosoma (to the Greenough)
Aspidites ramsayi (to the Greenough)
Denisonia monachus (to the Greenough) and
Pseudonaja modesta (to the Greenough)

It follows from the foregoing discussion that a high proportion of the species inhabiting the northern half of the region do not extend to the southern half, and vice versa. In previous analyses of west-coast herpetofaunas we have remarked on the high rate of latitudinal replacement of species *between* regions (Storr and Hanlon 1980). This, however, is the first time we have encountered a high rate of latitudinal replacement *within* a region, but then this is the first region studied in which there is a marked latitudinal gradient in rainfall, the annual mean doubling from north-east to south-west.

The only endemic taxa are the two lizards restricted to the Houtman Abrolhos: *Amphibolurus minor minimus* and *Egernia stokesii stokesii.*

We return to the problem of broken distributions along the mid-west coast of Western Australia. The principal disjunctions are in:

Phyllodactylus marmoratus – 460 km between Cockleshell Gully and False Entrance Well, Edel Land
Aclys concinna – 370 km between Coolimba and Tamala
Pletholax gracilis – 440 km between Eneabba and Useless Loop, Edel Land
Egernia multiscutata – 600 km between Stockyard Gully and Bernier I.
Lerista elegans – 425 km between 15 km N of Eneabba and Useless Loop, and
Morethia lineoocellata – 190 km between Badgingarra and Greenough

In December 1980 T.M.S. Hanlon was only able to reduce the disjunction in two of the above species (*Aclys concinna* and *Lerista elegans*), and then only by *c.* 30 km. However the time spent in the field (three weeks) was very short in relation to the large area covered. As it is difficult to distinguish between complete absence and very low density, we feel that most of the above disjunctions are not yet proved. The exceptional species are *Pletholax gracilis* and *Egernia multiscutata.* The separability of the northern population of *Pletholax gracilis* as a distinct subspecies (*edelensis*) implies geographic isolation. As for *Egernia multiscutata,* we concede that the skinks themselves may have been overlooked by naturalists, but hardly their conspicuous burrows.

Table 1 Distribution of the reptiles of the Houtman Abrolhos by island groups.

	North	Wallabi	Easter	Pelsaert
Cheloniidae				
Chelonia mydas	X	X		
Gekkonidae				
Crenadactylus ocellatus		X	X	X
Diplodactylus spinigerus		X		
Gehyra variegata		X		X
Heteronotia binoei	X	X		
Phyllodactylus marmoratus	X	X	X	X
Phyllurus milii		X		X
Pygopodidae				
Delma australis			X	
D. grayii		X		
Lialis burtonis		X		
Agamidae				
Amphibolurus minor	X	X		
Scincidae				
Cryptoblepharus carnabyi		X	X	X
Ctenotus fallens	X	X	X	X
Egernia kingii	X	X		X
E. stokesii		X	X	X
Lerista distinguenda			X	
L. elegans		X		
L. greeri		X		
L. lineopunctulata		X		
L. praepedita	X	X		X
Menetia greyii		X	X	
Morethia lineoocellata	X	X		
M. obscura				X
Boidae				
Python spilotus	X	X		
Elapidae				
Vermicella littoralis		X		
TOTAL	9	22	8	10

Finally some comments on the Houtman Abrolhos. Geographically the islands are divided into four quarters, namely (from north to south) North I. and the Wallabi, Easter and Pelsaert Groups. North I. and the western islands of the Wallabi, Easter and Pelsaert Groups are continental remnants that were separated from the mainland by rising sea-level *c.* 11500 years ago (Main 1961). The eastern islands in each group are recent accumulations of coral fragments (O'Loughlin 1969, Green 1972).

Twenty-five species of reptile occur in the Houtman Abrolhos; their distribution by island groups is set out in Table 1. Not surprisingly the Wallabi Group is the richest; in East Wallabi and West Wallabi it contains much the largest and most varied islands in the archipelago. Generally the fauna of North I. and the Pelsaert Group are attenuated versions of the Wallabi Group fauna. However, the fauna of the Easter Group is quite peculiar in its composition. Only eight species have been found in the group, but two of them, *Delma australis* and *Lerista distinguenda,* are not known from any other group. Moreover, *Delma australis* is absent from the opposite mainland, and *Lerista distinguenda* is restricted to one small part of the Geraldton region. A third Easter Group species, *Menetia greyii,* is unknown from other Groups except for its occurrence on Eastern I. in the Wallabi Group. Now Eastern I. is one of the islands recently formed from reef debris; and *Menetia greyii,* the sole reptile on the island, must have arrived there from over the sea. Perhaps the peculiarities of the Easter Group are similarly due to transmarine dispersal.

Comprising seven families, 17 genera and 21 species of reptiles, the fauna of the Wallabi Islands is continental in its diversity. Nevertheless this fauna differs considerably from that of any comparable area on the mainland. The last 11500 years has seen not only the evolution of distinct subspecies but also the extinction of such widespread west-coast reptiles as *Diplodactylus ornatus, Amphibolurus adelaidensis/parviceps, A. maculatus, Ctenotus lesueurii, Omolepida branchialis, Tiliqua occipitalis, T. rugosa* and *Pseudonaja affinis/nuchalis.* Nor has the mainland fauna gone unchanged in this period, as indicated by the withdrawal of *Crenadactylus ocellatus, Phyllodactylus marmoratus* and *Cryptoblepharus carnabyi.*

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