

COGGERIA NAUFRAGUS GEN. ET SP. NOV., A SAND-SWIMMING SKINK FROM FRASER ISLAND, QUEENSLAND

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*Coggeria naufragus* gen. et sp. nov. is a distinct lygosomine in the *Sphenomorphus* group. It has a digital formula of 3/3. A sharp snout and more than 40 lingually-directed maxillary teeth are key distinguishing characters. The new skink is a sand-swimmer, which feeds on worms. It is known only from Fraser Island, SEQ, a World Heritage Site. □ *Sphenomorphus* group, Scincidae, rainforest species, World Heritage Site, Fraser Is.

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On Fraser Island in June, 1991, Mike West found a small sand-swimming skink while digging. It was sent to the Queensland Museum for identification. At first glance, the damaged specimen, resembled *Saiphos equalis* (Gray, 1825). Several unsuccessful attempts were made to find more specimens. During summer 1994/95, a party from the Queensland Museum (PJC and JAC) and the Queensland Department of Environment and Heritage (SM, Rod Hobson, Keith Twyford, other staff and volunteers) collected several more specimens.

Like other World Heritage Sites in Queensland, Fraser Is. has been the focus of considerable research and management effort. The island's diverse reptile fauna (Barry & Campbell, 1977; Covacevich & Couper, 1991) in many habitats, including rainforest, was thought to be well known. That a secretive, very distinct skink from Fraser Is. rainforest should be discovered in 1991 indicates that there are still elements of the Queensland reptile fauna about which we know little.

The skink is assigned to the *Sphenomorphus* group within the Lygosominae. The *Sphenomorphus* group has a single frontal bone; palatine bones in contact on the ventral midline; ventrolateral ridges of the frontal each with a short process, and frontal separated from the palatine by an extensive section of prefrontal; nine premaxillary teeth; an open Meckel's groove; iris virtually as dark as pupil; parietal scales in contact behind the interparietal; posteriorlateral edge of each parietal bordered by two temporals and a nuchal, and a greatly enlarged medial pair of preanal scales (Greer, 1970, 1979, 1986a).

MATERIALS AND METHODS

All measurements were taken using Mitutoyo electronic callipers. Supraciliaries, supralabials, infralabials, and subdigital lamellae on the hind toes were counted on both sides. The following meristic characters have been used:- snout-vent length (SVL); axilla to groin (AG); tail length, vent to tip (TL); forelimb, axilla to tip of longest digit (L1); hindlimb, groin to tip of longest digit (L2); forelimb to snout, from axilla to tip of snout (L1-S); head length, tip of snout to posterior margin of parietals (HL); head width, measured level with the posterior margin of the parietals (HW); head depth, measured level with the posterior margin of the parietals (HD); snout, tip to anterior margin of orbit (S); eye to ear-crease, posterior margin of orbit to mid lateral margin of ear-crease (EE). Osteological characters are based largely on a single, cleared and stained specimen, QMJ59670, and supplemented by data (vertebral counts) from X-rays of QMJ57431, 59237, 59312, 59361, 59468-69 and 59671.

SYSTEMATICS  
*Coggeria* gen. nov.

TYPE SPECIES. *Coggeria naufragus* sp. nov.

ETYMOLOGY. For Harold Cogger, former Curator of Reptiles and Deputy Director of the Australian Museum, for his many contributions to knowledge and conservation.

DIAGNOSIS. Elongate body (Fig. 1), reduced limbs (front and rear limb 4.3% and 7.7% of SVL,



FIG. 1. *Coggeria naufragus* gen. et sp. nov.

respectively), snout wedge-shaped in profile (Figs 2,3); nasals slightly enlarged; prefrontals separated; supraoculars 3, first only in contact with frontal; last 2 supraoculars partially separated by a supraciliary; supraciliaries 5, first contacting frontal; supralabials usually 6, fourth below eye; postsupralabial single; ear opening absent; upper secondary temporal overlapped by lower. Osteology: maxilla-frontal contact; pre- and postfrontals in contact above orbit; postorbital absent; distinct narrowing of skull at premaxillary-maxillary junction; maxillary teeth greater than 40, with long axis of tooth running transversely and crowns directed lingually; dentary teeth more than 45; pterygoid teeth absent; presacral vertebrae 47-50; manus lacking intermedium, distal carpals 1 and 5 and metacarpals 1 and 5, and has phalanges reduced to 0.2.3.3.0; pes with astragalus and calcaneum fused, lacking distal tarsals 1 and 5, metatarsals 1 and 5, and with phalanges reduced to 0.2.3.3.0 (Fig. 4); sternal ribs 2; mesosternal ribs 1; ischia forming acute angle at symphysis with shafts paralleling those of pubes. Parietal peritoneum lacking pigment.

Other elongate genera of the *Sphenomorphus* group (*Anomalopus*, *Calypotitis*, *Coeranoscincus*, *Ophioscincus*, *Saiphos*, *Lerista*) share some of the apomorphies of *Coggeria* in varying combinations (Table 1). However, many of these apomorphies are associated with burrowing, and may point to parallel evolution rather than close relationships (Greer & Cogger, 1985). Anatomical

variation and phylogenetic relationships in the *Sphenomorphus* group, particularly in the non-Australian members, remain poorly known, and a well-corroborated cladistic phylogeny is not available.

*Coggeria* shares many apomorphies with *Coeranoscincus* (15; 18) and *Ophioscincus* (17), which are closely associated geographically. However, *Coeranoscincus* differs from *Coggeria* in having: teeth fang-like, posteriorly curved and sharply pointed; snout conical; ischial shaft weakly developed or absent. *Ophioscincus* differs from *Coggeria* in having: supraciliaries 3-4; supralabials 5; limbs 2% of SVL or shorter; phalanges absent on both manus and pes. Tooth shape and a high number of maxillary teeth of *Coggeria* set it apart from *Anomalopus*, *Calypotitis*, *Coeranoscincus*, *Ophioscincus*, *Saiphos* and *Lerista*, all of which have fewer than 26 maxillary teeth, with a generally upright or posteriorly-curved orientation (Cogger, 1992; Greer, 1983, 1986b, 1989; Greer & Cogger, 1985; Storr, 1971).

*Coggeria naufragus* sp. nov.  
(Figs. 1-5)

MATERIAL EXAMINED. HOLOTYPE QMJ59361, E of Central Stn workshop (25°28'42''S, 153°03'21''E) SEQ. PARATYPES QMJ57431, between Leading Hill & Lake Garrawongera, behind Poyungan Valley (25°23'S, 153°05'E); QMJ59237, N of Central Stn workshop (25°28'37''S, 153°03'15''E); QMJ59312,



FIG. 2. *Coggeria naufragus* gen. et sp. nov. showing wedge-shaped snout.

QMJ59468, W of Central Stn workshop (25°28'38"S, 153°03'15"E); QMJ59469, 1km S of Pile Valley, 1.5km E of Central Stn (25°28'56"S, 153°04'20"E); QMJ59670, QMJ59671 Central Stn, E of QDEH workshop (25°28'23"S, 153°03'23"E). OTHER MATERIAL: QMJ60232 (tail only), N of Central Stn workshop (25°28'37"S, 153°03'15"E). All from Fraser Island.

ETYMOLOGY. Latin *naufragus*, castaway, shipwrecked.

DIAGNOSIS. As for genus.

DESCRIPTION. SVL(mm)=62-127 (n=7, mean 98.2). Proportions as % SVL: AG=73.4-76.8 (n=7, mean 75.2); TL=76.5-83.1 (n=3, mean 79.2); L1=3.1-4.3 (n=7, mean 3.8); L2=6.2-7.7 (n=7, mean 6.7); L1-S=20.3-22.7 (n=6, mean 21.4); HL=7.5-9.8 (n=7, mean 8.2); HW=5.3-6.0 (n=6, mean 5.6); HD=4.1-4.5 (n=5, mean

4.4); S=3.3-4.0 (n=7, mean 3.5); EE=4.4-5.6 (n=7, mean 4.9).

Head indistinct from neck; snout wedge-shaped in profile. Nasals large, moderately spaced. Nostril positioned anteroventrally in nasal. Prefrontals large, moderately spaced. Frontal 1.2 times as long as wide; contacting prefrontals, frontonasal, frontoparietals, first supraoculars and first supraciliaries. Frontoparietals paired, in broad contact. Interparietal free, parietal eye present. Parietal scales in broad contact behind the interparietal. Enlarged nuchal scales 4-5 pairs. Two nuchals in direct contact with posterior edge of parietal scales. Loreals 2, first larger. Supralabial scales 6-7 (n=16, mean 6.1); where 6, fourth below eye; where 7, fifth below eye. Postsupralabial single. Infralabials 6. Postmental contacts 2 infralabials on each side. Three pairs of enlarged chin scales; first pair in contact, second pair separated by 1 longitudinal ventral scale row, third pair separated by 3 lon-

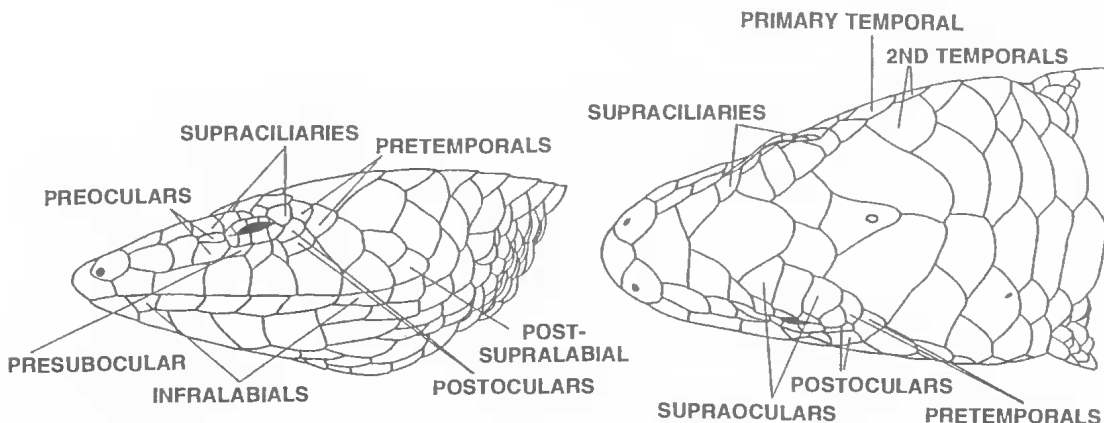


FIG. 3. Head scalation of the holotype (QM J59361) of *Coggeria naufragus* gen. et sp. nov.

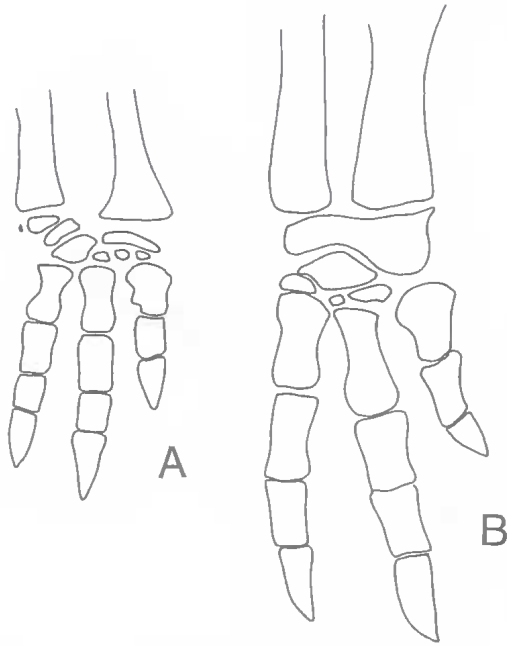


FIG. 4. Number and configuration of the bones in the manus (A) and pes (B) of *C. naufragus*.

gitudinal ventral scale rows (terminology follows Greer, 1989:152). Lower eyelid movable and scaly. Preoculars 2. Presuboculars 1. Suboculars 2. Supraoculars 3. Supraciliaries 5. Postoculars 2. Pretemporals 2. Primary temporals 1. Secondary temporals 2, upper the largest and overlapped by lower. External ear opening completely covered

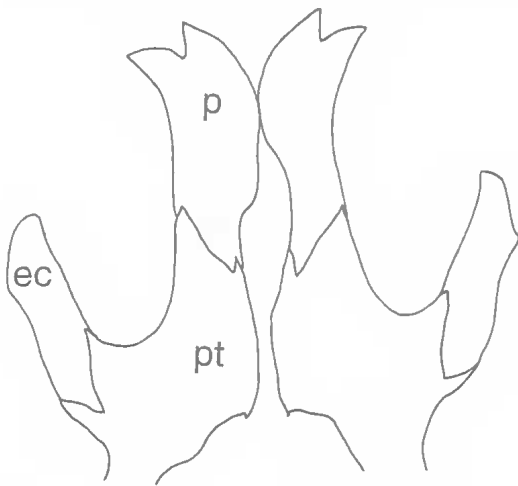


FIG. 5. Ectopterygoid, pterygoid and palatine area in *C. naufragus*.

by scaly epidermis, its former position indicated by an elongate, vertically-oriented, shallow depression.

Body elongate, with smooth scalation. Mid-body scale rows, 22-24 ( $n=8$ , mean 22.8). Paravertebral scales, from anteriormost nuchal to posterior margin of hindlimb 88-100 ( $n=7$ , mean 92.7); slightly enlarged. Number of scales in a direct line between mental and preanal scales 100-111 ( $n=7$ , mean 105.9). Medial pair of preanal scales enlarged, overlapping outer preanals. Limbs short, tridactyl. Subdigital lamellae on hindlimb - first toe 2-3 ( $n=16$ , mean 2.3), second toe 3-5 ( $n=16$ , mean 3.3), third toe 3-4 ( $n=16$ , mean 3.6). Original tail tapered distally, terminating sharply.

Skeletal features. Premaxillary teeth 9 ( $n=1$ ). Maxillary teeth 43/43 ( $n=1$ ). Dentary teeth 48/49 ( $n=1$ ). Frontal single. Vomers fused. Palatines in contact along ventral midline. Palatal rami of pterygoids with slight recurved processes. Ectopterygoid process absent (Fig. 5). Parietal foramen present. Postorbital bone absent. Supraorbital fenestra small, almost obliterated by close apposition of supratemporal arch to parietal. The hyoid apparatus is illustrated in Fig. 6.

Presacral vertebrae 47-50 ( $n=8$ ). Postsacral vertebrae 45 ( $n=1$ ). Complete inscriptional chevrons 11 ( $n=1$ ). Sternal/mesosternal ribs 2/1 ( $n=1$ ).

Manus comprising radiale, ulnare and pisiform; centrale; distal carpals 2-4; metacarpals 2-4, and phalanges 0.2.3.3.0. Pes comprising fused astragalus and calcaneum; distal tarsals 2-4; metatarsals 2-4; phalanges 0.2.3.3.0. (Fig. 4).

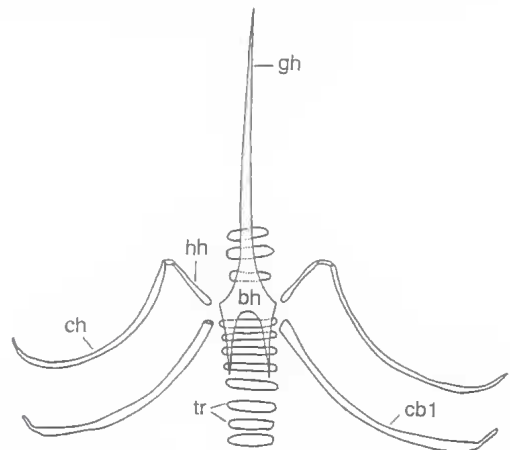


FIG. 6. Hyoid apparatus of *C. naufragus*. bh = basihyal, cb1 = first ceratobranchial, ch = ceratohyal, gh = glossohyal process, hh = hypohyal, tr = tracheal cartilages.



TABLE 1. Character states (derived +, plesiomorphic -) in reduced-limbed genera of the *Sphenomorphus* group. Data for genera other than *Coggeria* are from text and illustrations of Cogger (1992), Greer (1983, 1986b, 1989), Greer & Cogger (1985) and Storr (1971). For other material examined see Appendix 1.

CHARACTER: DERIVED STATE	GENERA						
	<i>Coggeria</i>	<i>Anomalopus</i>	<i>Coeranoscincus</i>	<i>Ophioscincus</i>	<i>Saiphos</i>	<i>Calyptotis</i>	<i>Lerista</i>
snout profile sharp	+	-	-	-	-	-	+/-
nasal slightly enlarged	+	+	+	+	+	-	+
loreal single	-	+/-	-	+/-	+	+	+/-
prefrontals absent	-	+/-	-	+/-	+	+/-	+/-
supraoculars 3 or less	+	+/-	+	+	-	-	+/-
first supraciliary contacting frontal	+	+/-	+	+	+	+/-	+/-
last 2 supraoculars partially separated by a supraciliary	+	+	+/-	-	-	+/-	+/-
supraciliaries <7	+(5)	+/(3-7)	+(4-6)	+(3-4)	+/(5-7)	+/(6-8)	+(0-6)
supralabials <7	+(6)	+(5-6)	+(6)	+(5)	+(6)	+(6)	+/(4-7)
supralabial below eye, not 5th	+(4)	+(3-4)	+(4)	+(3)	+(4)	+(4)	+/(2-5)
postsupralabial single	+	+/-	-	+	-	-	+/-
secondary temporals: lower overlaps upper	+	-	+/-	-	-	+/-	+
ear opening absent	+	+	+	+	+	+/-	-
front limbs ≤20% SVL	+(≤4)	+(≤7)	+(≤7)	+(≤2)	+(≤11)	+/(≤25)	+/(≤21)
rear limbs ≤28% SVL	+(≤8)	+(≤9)	+(≤9)	(a) +(≤2)	+(≤14)	+/(≤33)	+/(≤33)
midbody scale rows ≤26	+(22-24)	+(18-26)	+/(23-34)	+(18-24)	+(18-22)	+(18-24)	+(16-24)
nasal-prefrontal bone contact	-	+/-	-	-	-	+	-(b)
pre & postfrontals approach/contact above orbit	+	+	+	+	+	-	+/(c)
postorbital absent	+	+	+/-	+	+	-	+
ectopterygoid process present	-	+	-	+/-	+	+/(d)	+(e)
premaxillary teeth ≤9	-(9)	+(≤7)	+(8)	+/(≤9)	-(9)	-(9) (f)	+(≤7)
maxillary teeth ≥26	+(43)	-(<15) (g)	-(<26)	-(<21)	-(<21)	-(<20) (h)	-(<15) (c)
dentary teeth ≥26 (i)	+(48-49)	-(<18)	-(<26)	-(<22)	-(<23)	-(<22)	-(<18) (c)
presacral vertebrae >26	+(47-50)	+(≥43)	+(≥52)	+(≥43)	+(38-40)	+/(26-30)	+(≥31)
sternal ribs <3	+(2)	+/(≤3)	+(≤2)	+(≤2)	-(3) (j)	-(3) (k)	+/(≤3) (c)
mesosternal ribs <2	+(1)	+/(≤2)	+(≤1)	+(≤1)	-(2) (l)	-(2) (k)	+/(≤2) (c)
ischial & pubic shafts parallel	+	+	(l)	+	-(m)	-(n)	+/(c)
phalanges (manus), not 23453	+ 02330	+ 02320 01220 00000	+ 02330 00000	+ 00000	+ 02330	+ 23443 23433	+/- 23453 02453 02340 00230 00030 00020 00000
phalanges (pes), not 23454	+ 02330	+ 02200 00000	+ 02330 00000	+ 00000	+ 02330	+ 23453 23443 23444	+/- 23454 02454 02350 00350 00030 00000
parietal peritoneum unpigmented (o)	+	+/-	+	+	-	-	-

Measurements and scale counts for holotype (QMJ59361). SVL=106.5mm; AG=78.4mm; TL=88.5mm; L1=4.6mm; L2=6.8mm; L1-S=21.6mm; HL=8.4mm; HW=5.7mm; HD=4.8mm; S=3.5mm; EE=5.6mm. Maximum length of frontal 2.3mm; maximum width of frontal 2.0mm; four pairs of enlarged nuchal scales; supralabial scales 6; Midbody scale rows 22; paravertebral scales 88; number of scales in direct line between the mental and anal shields 100; subdigital lamellae on hindlimb (both sides of body), first toe 2, second toe 3, third toe 3.

Pattern. Dorsum light tan. Some scales with dark brown spots, forming broken, longitudinal lines on body and tail; head with dark brown mottlings. Ventral and lateral surfaces greyish, heavily marked with black flecks; sharply demarcated from dorsum by a dorsolateral row of black spots (1/scale), beginning behind the eye and running the full length of tail. Dorsal scales immediately adjacent to the black dorsolateral zone paler than those of the rest of the dorsum, in juveniles forming a stripe bordering the black dorsolateral zone; stripe less clearly defined in larger animals. Limbs grey, heavily mottled with black.

COMPARISON. *C. naufragus* can be confused with only Australian lygosomines with a digital formula of 3/3 (*Coeranoscincus reticulatus*, *Hemiergis decresiensis*, southwestern populations of *H. peronii*, some species of *Lerista* and *Saiphos equalis*). *C. naufragus* is separated from *C. reticulatus* by snout shape in profile (sharp vs bluntly conical) and number of maxillary teeth (>40 vs <26); from *H. decresiensis*, southwestern populations of *H. peronii* and *Lerista* spp. by lower eyelid (scaly vs clear window). From *Lerista*, it is further distinguished in lacking an external ear opening; from *Saiphos*, in having prefrontals and 2 loreals (vs 1).

HABITAT. Fossorial species associated with tall forest communities on sandy substrates. The type series was collected from three main vegetation communities: closed *Syncarpia hillii*, Satinay forest (Fig. 7A); mixed *S. hillii* and *Eucalyptus pilularis*, Blackbutt forest (Fig. 7B), and open *E. pilularis* forest (Fig. 7C). The *S. hillii* and mixed *S. hillii* / *E. pilularis* forests contain a *Backhousia myrtifolia* (Carrol) understorey and *Macrozamia miquelii* (Wild Pineapple) ground cover. The open *E. pilularis* forest has a *Monotoca scoparia* (Prickly Broom Heath) understorey. These forests have a long history of harvest, and mod-

ification by fire. They occur as a broad, broken, central strip on Fraser Is., between latitudes 25°08'–25°44'S, and are illustrated as vegetation types one to four on the Fraser Is. vegetation maps (Department of Forestry 1979, 1985). *C. naufragus* has been collected only between 25°20'–25°30'S. The association between *C. naufragus* and tall forest communities may reflect collecting effort, or population variations between different habitats. For many years, *Anomalopus pluto*, another fossorial skink, was believed to be associated with monsoon forests because this was present at its type locality. Subsequent collections have shown *A. pluto* to occur in a wide variety of vegetation types. Substrate, rather than vegetation type, appears to determine the distribution of *A. pluto* (Couper, 1992).

HABITS. *C. naufragus* is difficult to find during the cooler months and in dry periods. Most individuals (preserved and released) were caught during an extensive pit-trapping programme between 1 December 1994 and 15 March 1995. Surface activity occurs during the summer months in periods of high humidity, or immediately following rain. Most pit-trapped specimens were captured at night. Two specimens have been recorded while digging. The first of these, QMJ57431, was found during winter (13–15 June 1991). The second, a tail only (QMJ60232), was found 20cm below the surface, during an excessively dry period (17 Nov. 1994).

*C. naufragus* is an adept 'sand-swimmer'. Specimens held briefly in captivity for photography, in sand-filled ice-cream containers, 'disappeared' rapidly, evading capture repeatedly and easily. We surmise that this species is largely subterranean, and that it burrows deeply during cold and dry times.

No data are available on its breeding habits. However, a specimen (TL 80mm, SVL approximately 45mm) is considerably smaller than any specimens in the type series and was considered a juvenile. It was collected 15 August 1995, at Pile Valley, 2km E of the type locality and released.

DIET. Faecal and gut samples from QMJ59670, and a faecal sample from QMJ59671 show that *C. naufragus* is a worm feeder. Both faecal samples contained humus-rich soil (presumed to be worm gut contents), with a few sand grains and numerous oligochaete setae (L. Cannon pers. comm.). The gut sample contained similar

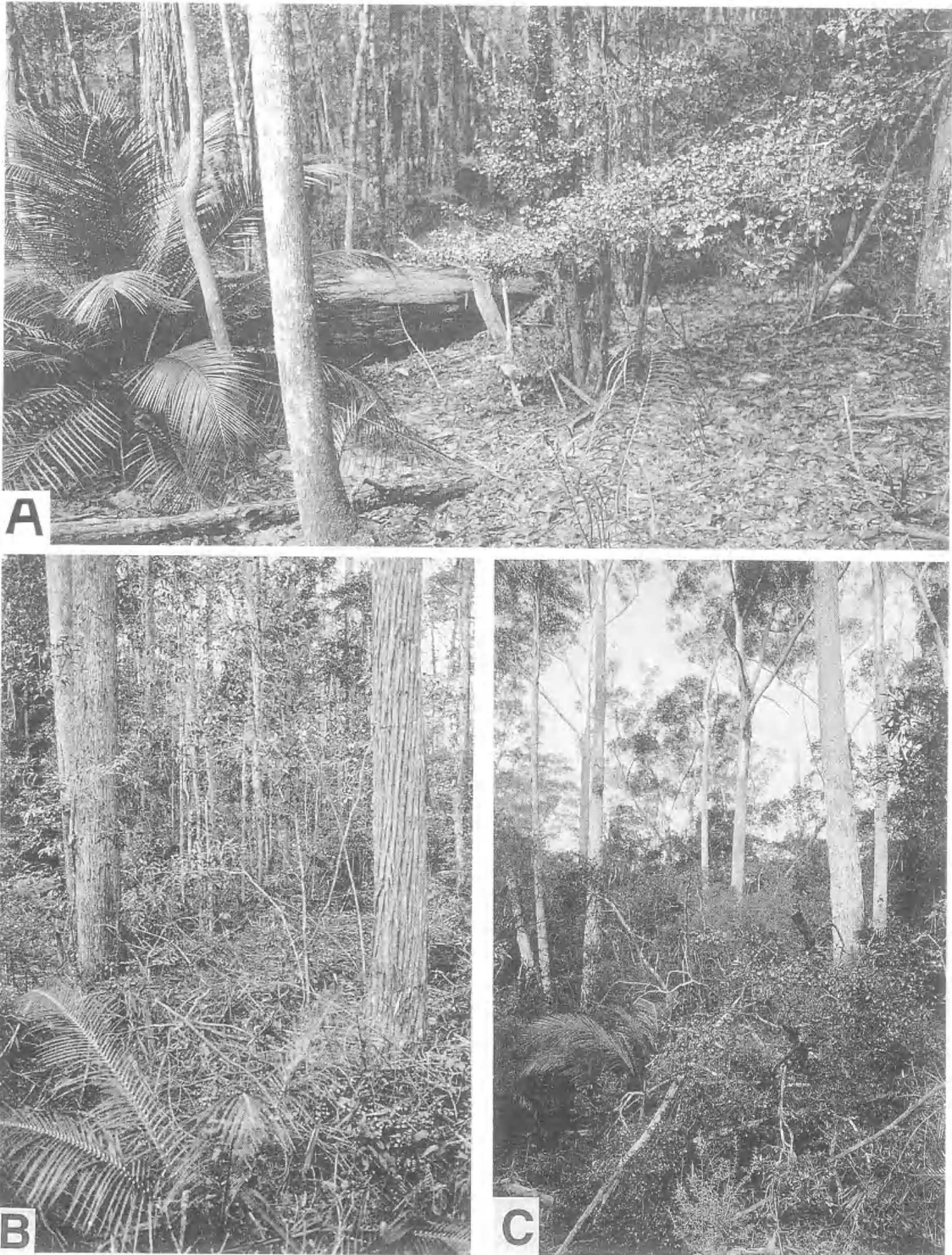


FIG. 7. Vegetation communities with which *C. naufragus* is associated. A, closed *Syncarpia hillii* forest. B, mixed *S. hillii* and *Eucalyptus pilularis* forest. C, open *E. pilularis* forest.

material, with what appeared to be worm dermal tissue.

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APPENDIX 1. Specimens examined in preparation of Table 1 and indicated on the table by superscript.

- (a) *Ophioscincus truncatus* (QMJ28853, QMJ28620, QMJ40988). (b) *Lerista bougainvillii* (AMR91671, AMR88302), *L. microtis* (AMR47895), *L. lineopunctulata* (AMR64384), *L. labialis* (AMR104024). (c) *Lerista bougainvillii* (AMR91671, AMR88302), *L. microtis* (AMR47895), *L. punctatovittata* (AMR104137), *L. lineopunctulata* (AMR64384), *L. labialis* (AMR104024). (d) *Calyptotis ruficauda* and *C. scutirostrum* after Greer, 1983; *C. temporalis* based on (AMR60765), *C. thorntonensis* based on (AMR56575). (e) *Lerista bougainvillii* (AMR91671, AMR88302), *L. microtis* (AMR47895), *L. punctatovittata* (AMR104137), *L. lineopunctulata* (AMR64384). (f) *Calyptotis ruficauda* and *C. scutirostrum* after Greer, 1983; *C. temporalis* based on AMR60765 and *C. thorntonensis* based on AMR56575. (g) *Anomalopus mackayi* count based on AMR13138. (h) *Calyptotis lepidorostrum* (AMR59246); counts for *C. temporalis* and *C. thorntonensis* inferred from X rays of AM type series. (i) *Anomalopus gowi* (AMR63130), *A. leuckartii* (AMR43949), *A. mackayi* (AMR13138), *A. pluto* (AMR94362), *A. swan-soni* (AMR5186), *A. verreauxii* (AMR6437); *Coeranoscincus frontalis* (AMR3823), *C. reticulatus* (AMR4795); *Ophioscincus cooloolensis* (QMJ27384), *O. ophioscincus* (AMR47642), *O. truncatus* (AMR866); *Saiphos equalis* (AMR7242); *Calyptotis lepidorostrum* (AMR59246), *C. ruficauda* (AMR52339), *C. scutirostrum* (AMR43061); *C. temporalis* and *C. thorntonensis* (X rays of type series). (j) AMR104138. (k) AM X rays - *Calyptotis lepidorostrum* (AMR90305), *C. scutirostrum* (AMR76120), *C. temporalis* (unregistered), *C. thorntonensis* (AMR56603), and *C. ruficauda* (AMR69547). (l) Not applicable; ischium not projecting in either *Coeranoscincus frontalis* (AMR89278) or *C. reticulatus* (AMR6375). (m) AMR104138. (n) AM specimens: *Calyptotis lepidorostrum* (AMR90305, X ray), *C. ruficauda* (AMR69547), *C. scutirostrum* (AMR76120), *C. temporalis* (X ray), *C. thorntonensis* (AMR56603, X ray). (o) *Anomalopus leuckartii* (QMJ33156), *A. verreauxii* (QMJ57097), *A. brevicollis* (QMJ33122), *A. gowi* (QMJ45361), *A. pluto* (QMJ54040, QMJ54083, QMJ54213), *A. swan-soni* (QMJ42773); *Calyptotis lepidorostrum* (QMJ57061), *C. ruficauda* (QMJ26024), *C. scutirostrum* (QMJ30616), *C. temporalis* (QMJ31794), *C. thorntonensis* (QMJ58111); *Saiphos equalis* (QMJ56908).