

Cambridgea quadromaculata n. sp. (Araneae, Stiphidiidae): a large New Zealand spider from wet, shaded habitats

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Abstract A new species of Stiphidiid spider belonging to the endemic New Zealand genus *Cambridgea* is described from Riccarton Bush, Christchurch and Kaituna Valley, Banks Peninsula. *Cambridgea quadromaculata* n. sp. is large, active, and apparently makes no substantial webs. Both samples were from wet habitats vulnerable to intermittent flooding. Characters that distinguish *C. quadromaculata* from other large *Cambridgea* are specified. Attention is drawn to a possible ecological and systematic parallel between *Cambridgea* and the European genus *Tegenaria* Latreille (Agelenidae).

Keywords spiders; Stiphidiidae; *Cambridgea*; Agelenidae; *Tegenaria*

INTRODUCTION

The first spiders described from New Zealand were large-bodied species. *Cambridgea antipodiana* (White 1849, 1850) was originally assigned to a European agelenid genus, *Tegenaria*; *Cambridgea* was erected by L. Koch (1872). The 14 species of *Cambridgea* currently recognised are treated as

Stiphidiidae (Forster & Wilton 1973). They spin ecribellate sheet webs with tubular retreats and run, inverted, beneath them. The webs are mostly small and are usually poorly organised, although that of *C. foliata* (L. Koch) is typically a large, well-structured sheet.

When one of us (A.D.B.) was collecting from the Kaituna Stream, Banks Peninsula, in 1975, two large, speckled spiders ran away rapidly when disturbed but evaded capture. A sub-adult female was collected there in January 1994, and adults and sub-adults were found in both the Kaituna Valley and in permanently wet areas of Riccarton Bush (formerly known as Deans Bush) in Christchurch, in April–May 1994. They proved to be a new species of *Cambridgea*.

We discuss some parallels between the systematics and ecology of *Cambridgea* and those of European house spiders in the agelenid genus *Tegenaria* Latreille.

METHODS

In the Kaituna Valley, spiders were found beneath rocks in the Kaituna Stream, or close to it. In Riccarton Bush, wet and relatively dry areas were searched by turning over logs, or by examining the bases of grass tussocks flanking drainage ditches. Live spiders were maintained in cages at a constant temperature of 25°C under a 12:12 h light:dark cycle. They were provided with scaffoldings made from thin wooden sticks on which to build webs, small petri dishes filled with wet cotton wool, live house flies (*Musca domestica* L.), and small moths.

Live material for comparisons was obtained as follows: *C. antipodiana* (White) were collected in Christchurch; *C. secunda* Forster and Wilton and *C. arboricola* (Urquhart) from Flagstaff, Dunedin; recently captured specimens of *C. annulata* Dalmas from the Chatham Islands were a gift from Cor Vink (Lincoln University, New Zealand).

For description, specimens preserved in 70% ethanol were handled by conventional techniques. It

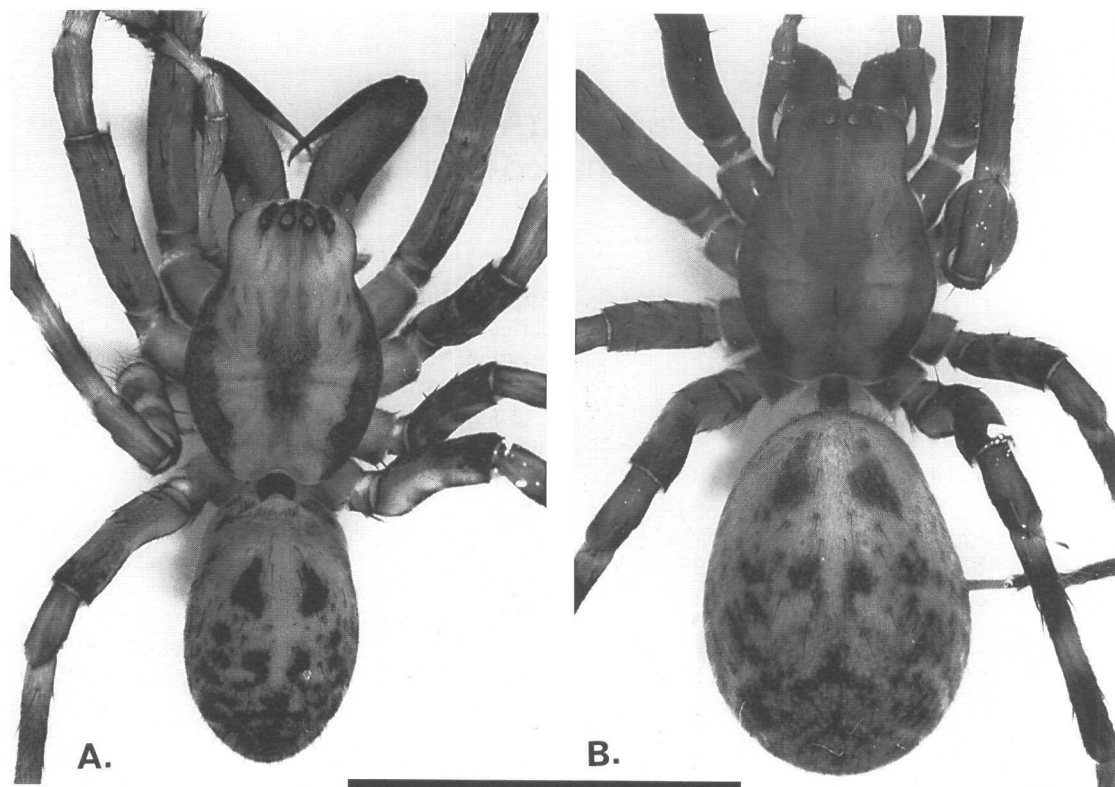


Fig. 1 *Cambridgea quadromaculata* n. sp. A, Holotype male. B, Allotype female. Scale bar 1 cm.

was difficult to obtain strictly replicable orientations of the male palps; the problems are specified in the Discussion.

Female genitalia were prepared by dissecting vulvae, and macerating them in warm 10% KOH until soft tissues had dissolved. They were washed in several changes of distilled water, passed through a series of graded alcohols, and observed under 70% ethanol.

Prepared vulvae were drawn from a ventral aspect. Although the relationships between the bursae, receptaculae, and ducts are somewhat obscured, the small triangular sclerotised process at the anterior margins of the epigyna can be oriented en face to provide a fiducial landmark. The descriptions and measurements of the type specimens follow the convention established in the spiders of New Zealand, Vol. I–VI, cf. Forster & Wilton (1973).

RESULTS

Cambridgea quadromaculata n. sp.

Male (Fig. 1A)

MEASUREMENTS (millimetres):

Carapace	length 7.1	width 5.5
Abdomen	length 6.0	width 4.4

	Femur	Pat- ella	Tibia	Meta- tarsus	Tarsus	Total
Leg 1	7.4	2.9	8.3	7.4	3.9	29.9
Leg 2	6.6	2.6	6.3	5.6	3.6	24.3
Leg 3	5.7	2.1	4.6	3.6	2.0	18.0
Leg 4	6.3	1.8	6.6	6.6	3.5	25.0
Palp	4.1	1.2	2.0	4.4	11.7	

Chelicerae length 5.6

COLOUR: Carapace pale yellowish brown. A broad brown median band is distinct in the middle of the

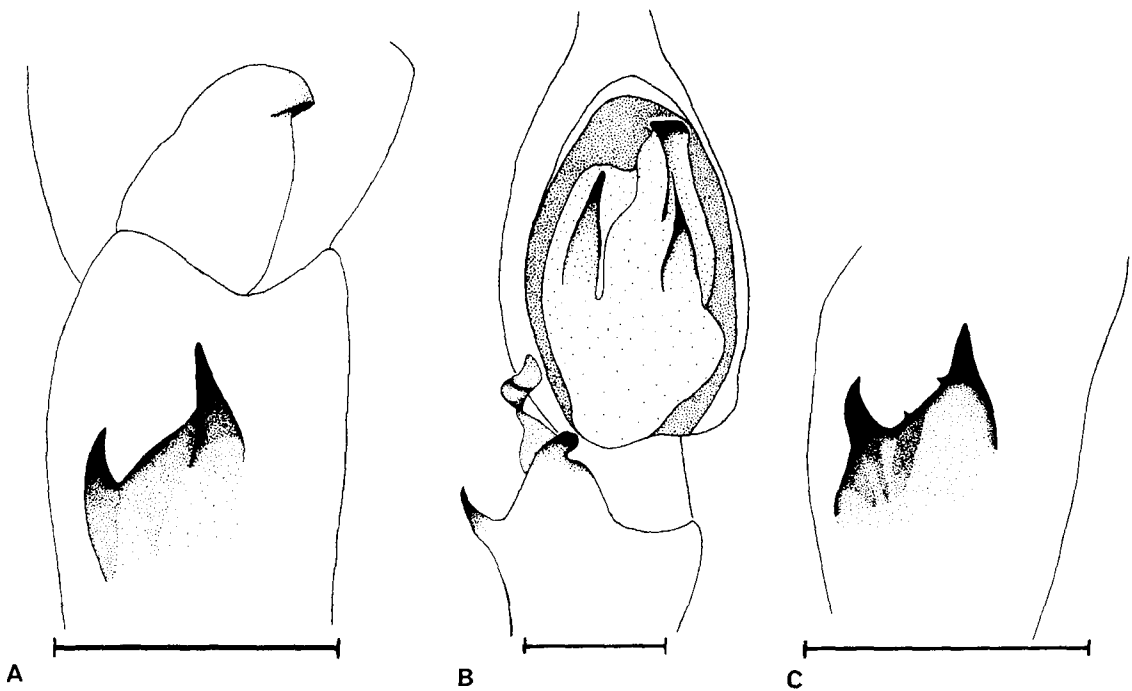


Fig. 2 *Cambridgea quadromaculata* n. sp. **A**, Tibial apophyses, from ectal aspect. **B**, Male palp, from ventral aspect. **C**, Bifid tibial apophysis of paratype male, from ectal aspect. Scale bars 0.5 mm.

carapace but becomes narrower and faint towards both the eyes and the posterior margin. There is a narrow, darker band on each lateral margin. Legs brown, strongly banded. Abdomen pale greyish brown; the dark dorsal pattern typical of many *Cambridgea* (Forster & Wilton 1973) includes a relatively clear anterior dorsal area with 4 well-defined greyish-black spots (Fig. 1A). Chelicerae chestnut brown. Ventral surface of abdomen dark, with an obscurely defined median band.

CHELICERAE: Porrect and very long. There are 4 basal promarginal teeth, 1 minute, and 2 distal retromarginal teeth, the most distal being very large and blunt.

PALP (Fig. 2A–C): The prolongation of the cymbium is exceptionally pronounced; the bulb is c. one-fifth of the total length of the tarsus. The bifid tibial apophysis has a broad “saddle” that separates the 2 processes (Fig. 2A). The saddle of 1 male paratype bears 2 minute denticles (Fig. 2C), that of the second a single denticle.

STRIDULATING ORGAN: Well developed, with 6 distinct weakly sclerotised abdominal ridges.

Female (Fig. 1B)

MEASUREMENTS:

Carapace	length 7.1	width 5.5				
Abdomen	length 10.5	width 6.9				
		Pat-		Meta-		
	Femur	ella	Tibia	tarsus	Tarsus	Total
Leg 1	4.8	1.2	7.5	5.3	3.3	22.7
Leg 2	4.2	1.5	1.9	4.5	3.0	15.1
Leg 3	5.0	1.2	4.5	4.5	2.4	17.6
Leg 4	6.0	2.0	6.0	6.8	3.3	24.0

COLOUR: Resembles the male, but the much larger, rather globose abdomen makes the 4 dark dorsal anterior spots more conspicuous.

CHELICERAE: 3 promarginal teeth, proximal to the cheliceral furrow; the basal tooth is small. 2 large, distal retromarginal teeth.

GENITALIA: Epigynum, Fig. 3A. Vulva, cleared in 10% KOH and observed from the ventral side under 70% ethanol, shown in Fig. 3B.

GENERAL: As in many *Cambridgea* species, the appendages and abdomen are densely covered with fine, recumbent plumose hairs. The dorsal abdomen also bears sparse, erect bristles.

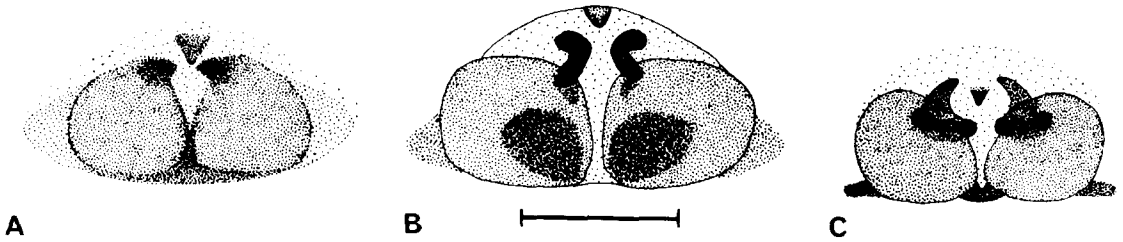


Fig. 3 A. Epigynum of *Cambridgea quadromaculata* n. sp. B. Vulva of *Cambridgea quadromaculata* n. sp., cleared as described by the text, from the ventral aspect. C. Cleared vulva of *Cambridgea antipodiana* (White), observed from the ventral aspect. Scale bar 0.5 mm.

TYPES: Holotype male, Riccarton Bush, captured as sub-adult 9.iv.94, moulted in the laboratory 13.iv.94. Allotype female, Riccarton Bush, 5.iv.94, Otago Museum, Dunedin.

RECORDS: Paratypes from Riccarton bush: an adult and 1 sub-adult female, 27.iii.94. 2 adult females, 7.iv.94. 1 sub-adult male and 4 sub-adult females, 9.iv.94. From the Kaituna Valley Stream: 1 sub-adult female, 12.i.94. 1 adult female and a sub-adult male which moulted later, 15.v.94.

Ecology and behaviour

Cambridgea quadromaculata has only been found in two wet habitats. In Riccarton Bush, most spiders were collected by searching the bases of tussocks that flanked or were close to drainage ditches. Those from the Kaituna Valley were taken either under stones flanking the Kaituna Stream, or in detritus piled by the flow of water against rocks. At both sites, numerous sub-adults and juveniles were seen but not collected. The habitats are forest relicts with dense covers of foliage and low ambient light. In laboratory cages, abundant drag-lines revealed captive spiders to be active at night. They did not build orderly webs, nor make use of the refuge-like structures provided. During day, they tended to rest close to sodden cotton wool in petri dishes. Later, they hung suspended from the untidy scaffoldings created by their nocturnal excursions. No spider was seen to possess an organised web in the field, although two females found under logs were resting in small silken tangles. The observations imply a preference for wet habitats vulnerable to intermittent flooding and are supported by the comparable escape behaviours shown by those species of *Mynoglenes* (Linyphiidae: Mynogleninae) adapted to stream-bed occupancy (Blest 1979 and in prep.).

DISCUSSION

Differential diagnosis

To separate *C. quadromaculata* from other, mostly smaller species of *Cambridgea*, certain characters must be addressed in detail. Firstly, however, which *Cambridgea* are of equivalent size to *C. quadromaculata*? *C. foliata* (L. Koch) is larger, quite distinct, and although common in North Island, in South Island has been found only in NW Nelson, Marlborough, and Westland. *C. annulata* Dalmas, biggest of all, is confined to the Chatham Islands. Both are eliminated by their genitalia (Forster & Wilton 1973). Several species are too small to be confused with the new species.

A good male character is the tibial apophysis that lies ectally at various distances from the distal end of the segment. It is bifid, and for comparative purposes must be viewed strictly en face. The line drawings we employ differ from the illustrative technique used by Forster & Wilton (1973). To establish our convention, we illustrate the tibial apophyses of *C. antipodiana* (White) and *C. arboricola* (Urquhart) (Fig. 4A, B), and the palp and tibial apophyses of a single male from Riccarton Bush that we tentatively identify as *C. agrestis* Forster and Wilton (Fig. 5A, B).

Four species in which the bifid apophysis lies at the distal extremity of the tibia are thus excluded: *C. annulata* Dalmas, *C. arboricola* (Urquhart), *C. peculiaris* Forster and Wilton, and *C. secunda* Forster and Wilton. The apophysis of *C. quadromaculata* has a marked saddle separating the two teeth. Those of *C. agrestis* Forster and Wilton, *C. sylvatica* Forster and Wilton, *C. fasciata* L. Koch, and *C. plagiata* Forster and Wilton have much shorter saddles. Tibial apophyses of the remaining species whose males are known lack "saddles"

Fig. 4 **A.** Tibial apophyses of *Cambridgea antipodiana* (White). **B.** Tibial apophyses of *Cambridgea arboricola* (Urquhart). Both drawn from the ectal aspect. Scale bars 0.5 mm.

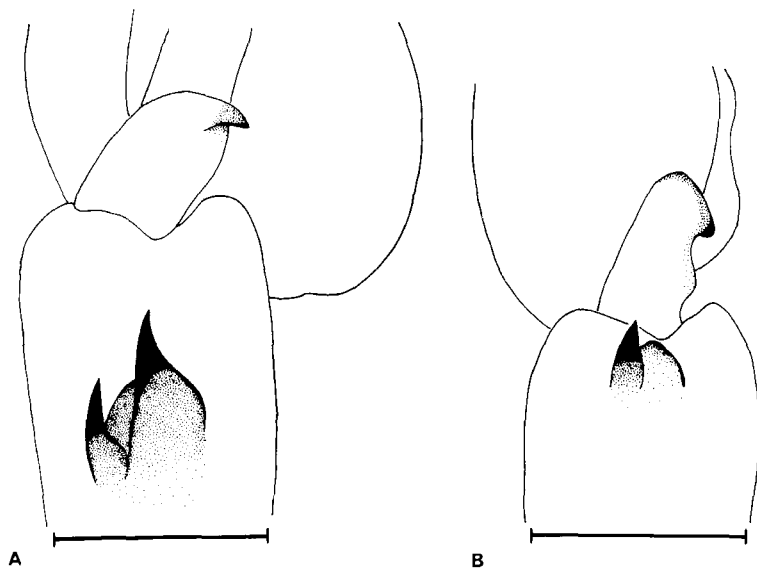
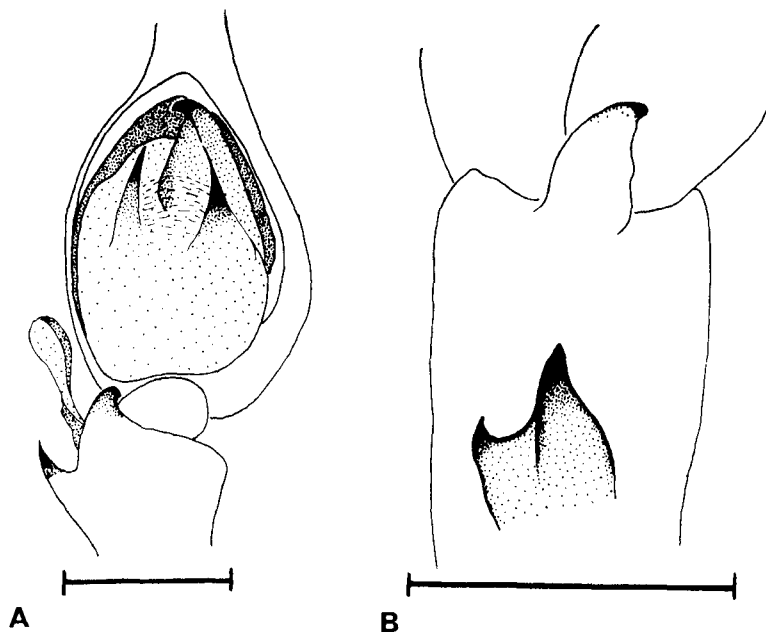


Fig. 5 Male palp of a *Cambridgea* sp., provisionally identified as *C. agrestis* Forster and Wilton. **A.** Ventral aspect of the palpal organ. **B.** Ectal aspect of the tibial apophyses. Scale bars 0.5 mm.



between the teeth altogether. The true terminal tibial apophyses are complex leaf-like processes whose comparative characterisation must await a revision of the genus.

The female genitalia present many problems, some created by their simplicity and changes in the appearance of an epigynum following storage in preservative. Most notably, the anterior, triangular sclerotised process at the anterior margins is larger

in *C. quadromaculata* than in other species with which it might be confused. The positions of the fertilisation ducts are helpful. Those of *C. quadromaculata* are directed ectally in the horizontal plane (Fig. 3A, B), a condition elsewhere only seen in *C. secunda* and *C. turbotti*, where it is much modified (Forster & Wilton 1973). The ducts of *C. antipodiana* are directed mesially (Fig. 3C). In a few species they point anteriorly. Real dispositions are

barely visible, if at all, unless the vulvae are cleared in KOH for examination.

A systematic and ecological parallel

In some ways, the genus *Cambridgea* may offer a situation comparable to that posed by the large European "house spiders" in the agelenid genus *Tegenaria*, which commonly invade and occupy buildings from poorly specified natural habitats. Because of their sizes, phobia-inducing appearances, and no more than small differences between the genitalia of the species, *Tegenaria* were not systematically collected and studied. Locket (1975) revealed that British *Tegenaria* comprised a muddle of synonymic confusion and misattributions. It is possible that New Zealand *Cambridgea* deserve the same attention, although their exploitation of dwellings is less marked. *Tegenaria domestica* (Clerk), introduced from Europe, is well-established throughout New Zealand as a successful occupant of houses and out-buildings; some *Cambridgea* also invade houses (Forster & Wilton 1973).

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