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THREE TASMANIAN SPIDERS OF THE GENUS *CELAENIA* THORELL (ARANEIDA) WITH NOTES ON THEIR BIOLOGY

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(With one plate and nine text figures)

ABSTRACT

Specimens of the Bird-dung Spider, *Celaenia excavata* (L. Koch) from Tasmania have been identified by Dr H. W. Levi as synonymous with *Celaenia kinbergi* Thorell. An amplified description of the dwarf male of this spider is given with some observations on the biology of the species. Thirteen egg-sacs made by one female contained a total of 1630 eggs. Of these 724 gave rise to males, 718 to females and 188 failed to develop. The sex ratio is therefore almost 1 : 1. From hatching of the egg males pass through three instars, females through seven, before becoming adult. In the case of specimens hatched in October males reach maturity in about 134 days and females in 395 days. Under laboratory conditions males, after reaching maturity, may live from 255 to 615 days, females for about 425 days.

Celaenia distincta (O. Pick-Cambr.) from New South Wales and *Celaenia atkinsoni* (O. Pick-Cambr.) from New Zealand are recorded from Tasmania for the first time. The hitherto unknown male of *C. distincta* is described and notes on the biology of the two species given.

INTRODUCTION

Spiders belonging to the genus *Celaenia* Thorell occur in Australia and New Zealand. Bonnet (1956) lists five species from each country. It is probable, however, that when the species are fully compared the number may be reduced by synonymy. Female specimens of one and the same species often appear very different according as to whether they are gravid or non-gravid. When the abdomen is distended with eggs, tubercles and folds on the surface tend to become smoothed out. Of the species listed only one is recorded as occurring in Tasmania (Simon 1892). In the present paper two others are reported from this State.

Males of species in the genus *Celaenia* are dwarfs and rarely seen. Most of the descriptions are based on females. By raising specimens in the laboratory the males of two species were bred from the egg to maturity.

Celaenia kingbergi Thorell 1868
(Pl. I, fig. 1)

The spider which occurs in Tasmania and other parts of Australia and is often referred to as the Bird-dung Spider, Orchard Spider or Death's Head Spider, has long been identified as *Celaenia excavata* (L. Koch). However, Dr H. W. Levi, who examined specimens which I sent him from Tasmania and also the type of *C. kinbergi* Thorell, states *(in litt.)* that the two species are synonymous. The name *C. kinbergi* takes priority over *C. excavata*.

The female has been fully described by Thorell (1868), Koch (1872) and others. The description of the male as given by Karsch (1878) is very brief. Hence the following more detailed account is provided.

MALE: Measurements in millimetres:

Body length	2.97
Length of carapace	1.48
Width of carapace	1.37
Length of abdomen	2.00
Width of abdomen	2.57
Height of abdomen	2.00

Leg	*Femur*	*Patella*	*Tibia*	*Metatarsus*	*Tarsus*	*Total*
1	1.94	0.79	1.09	0.60	0.45	4.87
2	2.12	0.75	1.07	0.62	0.44	5.00
3	1.04	0.45	0.51	0.49	0.34	2.83
4	1.16	0.41	0.62	0.55	0.34	3.08
Palp	0.38	0.19	0.16	—	0.62	1.35

Colour: Carapace dark brown with a yellowish V-shaped mark pointing forwards on the highest part of the thoracic region and two yellow radial marks on each side. Margin yellowish. Three black submarginal spots on each side. A median yellow stripe extending downwards beween AME to front margin. Palpi, chelicerae, maxillae and labium dark brown. Sternum dark brown with an elongate median yellow mark on posterior half. Legs with coxae and distal half of femora dark brown. Basal half of femora almost white. Patellae light brown. Tibiae white with black band round basal half. Metatarsi white with black band at apex. Tarsi mainly white basally and black distally. Abdomen white with a black median spot in front and several black marks on each side. Spinnerets black, surrounded by a large black area.

Carapace: Almost as wide as long, rounded at the sides, moderately high between second and third legs, sloping steeply to hind margin. Head region strongly narrowed forming a blunt point, which projects over the clypeus. A median row of black clavate setae extends from eyes to middle of carapace. Similar setae are present on front and sides of head region and also in radial rows on sides of thorax.

Eyes: Eight in two rows. Viewed from above front row appears recurved and hind row slightly procurved. Eye ratio AME : ALE : PME : PLE = 6 : 5 : 6 : 5. AME separated from each other by 5/2 and from ALE by 3/2 of their diameter. PME separated from each other by 5/2 and from PLE by 3/2 of their diameter. Median ocular quadrangle almost square. Lateral eyes contiguous. Height of clypeus equal to twice the diameter of AME.

Chelicerae: Conical, slightly geniculate, sloping backward, with two small teeth on retromargin of furrow.

Fang slightly curved and coarsely serrate on basal half of inner margin.

Maxillae: Slightly converging, rounded in front and on outer side. A light scopula on inner margin and a well devolped serrula in front.

Labium: Wider than long, rounded in front reaching about half the length of the maxillae.

Sternum: Shield-shape, longer than wide in ratio 3 : 2, widest between second coxae, slightly procurved on front margin and ending in a narrow point between fourth coxae, slightly excavated round bases of third and fourth coxae.

Legs: Length order 2. 1. 4. 3. Lightly clothed with barbed hairs Patellae and basal half of tibiae with thick clavate hairs (fig. 1) on dorsal surface. Femora of first, second and third pairs of legs with two longitudinal rows of short stout spines on ventral surface. Spines of row nearer promargin somewhat larger than those of other row. Patellae of first and second legs strongly bent near base. Six trichobothria on basal half of each tibia and one on each metatarsus except the fourth, which has none. Three tarsal claws. Upper claws of first and second legs strongly dissimilar, the proclaw being much smaller than the retroclaw, which is long and only slightly curved (fig. 2). The proclaw has three teeth, the retroclaw two, the second tooth from base being in the form of an oval blade (fig. 3). Lower claw bent almost at a right angle, sharply pointed, with one tooth. The upper claws of third and fourth legs more nearly similar. Several accessory claws present on all tarsi.

Palpi: Nearly equal in length to carapace, lightly clothed with barbed hairs. Cymbium large and spoon-shaped with a short, stout curved apophysis at the base on the retrolateral side. The form of the genital bulb partly extended is shown in fig. 4. Embolus is of the coniform type. Middle division of genital bulb has a hook-shaped median apophysis. Tibia has six trichobothria, three on each side.

Abdomen: Wider than long, with height equal to length. Overlaps carapace anteriorly. Highest part in front half. Anterior surface steeply ascending and marked with a large trapezium-shaped depression. On each side of the highest part are two small tubercles. Posterior surface slopes steeply to hind margin. At sides the integument forms a series of about five folds, which become continuous above the spinnerets. There is a transverse row of four muscle spots on the highest part of the abdomen and two similar rows, one below the other on the posterior surface. The integument is tough with patches of black clavate hairs. Ventral surface somewhat folded. Spinnerets six, conical, anterior pair larger than others.

Occurrence: Males like the females are usually found on shrubs and small trees, where they rest on the leaves. Occasionally they occur on grass. Specimens have been collected at Launceston, 21 March 1925; Sandy Bay, 23 February 1944; and New Town, 25 February 1946.

BIOLOGY

Habits: The female has been found on apple trees, gorse, briars, pines, cypresses, prickly box and other shrubs and trees. It generally rests on a small mat of threads on the surface of a leaf, but when the egg-sacs are made, it is usually found resting on them and is rarely more than three metres from the ground, often less than two metres. The spider does not spin a web for the capture of prey. Its food appears to consist entirely of night-flying moths. Specimens bred to maturity in the laboratory refused at all stages to feed on flies. Even the young spiders, newly emerged from the egg-sac, would accept only small moths. During the day the spider sits motionless with its legs folded close to the body. It makes no attempt to capture prey and, if touched, shows little tendency to move. At night, however, it often rests with the first and second pairs of legs extended or with the legs in the same attitude it may hang suspended on a thread. If a moth flutters near enough, it is at once seized and held securely against the rows of spines below the femora.

Egg-sacs: In one season a single female may make as many as 13 egg-sacs but the usual number seems to be about seven (Butler 1933, Roberts 1937). The egg-sacs are spherical and 9 - 15 mm. in diameter (Table I). The external wall is brown with a few dark streaks and is tough and parchment-like. Immediately within the outer wall is a soft fluffy layer of yellowish silk that surrounds the egg-mass. A female specimen of the spider found in a garden at New Town, 24 October 1950, had seven egg-sacs, all woven into a cluster with strong threads of brownish silk. The spider and its egg-sacs were transferred to a vivarium in the laboratory, where a further six egg-sacs were made during the next four months. The laying of eggs and making of the egg-sac is carried out at night and occupies about one hour. When the eggs are laid they adhere together in a mass, which is suspended by a thread. The spider hangs by one of its second legs from a foot-hold on the shrub or on previously made egg-sacs. It then brings its spinnerets against the suspended egg-mass and proceeds to cover it with the layer of soft yellowish silk. To accomplish this the mass is rotated and manipulated by means of the spider's palpi and free legs. Finally the outer layer of brown parchment-like material is added. The completed egg-sac is then drawn up and attached to the shrub or to the other egg-sacs.

In the thirteen egg-sacs made by the one spider the number of eggs in the separate sacs varied from 32 to 235. Egg-sacs of the same size did not always contain the same number of eggs (Table I).

Table I

Celaenia kinbergi Thorell. Progeny from thirteen egg-sacs (A-M) made by the same spider.

Egg-Sac	Diameter (mm.)	Eggs	Males	Females	Undeveloped
A	15.0	235	99	119	17
B	14.0	166	89	76	1
C	14.0	216	110	101	5
D	13.0	145	67	68	10
E	13.0	176	89	87	0
F	13.0	136	49	58	29
G	12.0	112	45	33	34
H	12.0	75	33	41	1
I	12.0	145	39	39	67
J	11.0	64	31	33	0
K	11.0	56	27	29	0
L	11.0	72	39	31	2
M	9.0	32	7	3	22
Totals	—	1630	724	718	188

Immature stages and number of instars: The eggs are yellow and vary in shape, some being spherical with a diameter of 1.43 mm., others oval with a length of 1.63 mm. and a width of 1.41 mm. The duration of incubation varies according to the temperature. In summer eggs usually hatch in about 28 days. The chorion splits about 10 - 13 days prior to hatching. An ecdysis takes place within the chorion at the time of hatching. The exuviae are left behind in the crumpled chorion, when the first instar escapes into the egg-sac. The exuviae thus cast off bear the two egg-teeth and the integument of the two book-lungs, each with nine leaves.

The *first instar* corresponds to that designated by Holm (1940) as the first postembryonal stage. It has the following measurements in millimetres:

Total length	2.06
Length of carapace	0.80
Width of carapace	0.74
Length of abdomen	1.37
Width of abdomen	1.31

Leg	*Femur*	*Patella*	*Tibia*	*Metatarsus*	*Tarsus*	*Total*
1	0.61	0.42	0.34	0.25	0.27	1.89
2	0.56	0.37	0.34	0.26	0.27	1.80
3	0.41	0.26	0.25	0.21	0.26	1.39
4	0.41	0.26	0.29	0.25	0.23	1.44
Palp	0.16	0.14	0.14	—	0.21	0.65

The body is colourless except for the yellow egg-yolk within the abdomen. Integument of body and appendages is covered with numerous minute spinules. Carapace rounded in front and slightly narrowed. Eyes becoming pigmented. Chelicerae without teeth; the fang short and conical. Legs and palpi without hairs and bristles, except for a few on each side of the tarsi, one above each metatarsus and two above each tibia (fig. 5). Trichobothria absent. Tarsal claw single and without teeth. Abdomen broadly oval, without tubercles and hairs. Six spinnerets present but non-functional. Book-lungs have 13 leaves.

In the case of eggs that hatch in October the duration of the first instar is 23-25 days (Table II). However, the progeny from eggs laid in the late summer or autumn may remain as first or second instars throughout the winter and not emerge from the egg-sacs until the spring or early summer.

The *second instar* corresponds to that designated by Holm (1940) as the second postembryonal stage. It has the following measurements in mm.:

Total length	2.23
Length of carapace	0.97
Width of carapace	0.91
Length of abdomen	1.26
Width of abdomen	1.54

Leg	*Femur*	*Patella*	*Tibia*	*Metatarsus*	*Tarsus*	*Total*
1	1.10	0.55	0.59	0.33	0.33	2.90
2	1.03	0.47	0.59	0.34	0.34	2.77
3	0.63	0.30	0.34	0.26	0.29	1.82
4	0.71	0.31	0.40	0.33	0.29	2.04
Palp	0.15	0.12	0.16	—	0.24	0.67

Colour and markings as in the adult. The general form of the body also resembles that of the adult. The carapace, however, is not so strongly narrowed in front and the tubercles on the head region of the mature female are not present. On the distal half of the dorsal surface of the second femora there is a dense clothing of thick black barbed hairs. Two trichobothria on each tibia and one on each metatarsus except the last, which has none. Tarsal claws as in adult. Tarsus of palpi in males is already swollen and it is therefore possible to distinguish the sexes at this early stage. Form of abdomen like that of adult but surface is more rounded. Spinnerets are now functional and the spider able to spin a drag line.

Table II

Celaenia kinbergi Thorell. Number and duration (in days) of the juvenile instars of six specimens (A-F) bred in the laboratory.

	Chorion split	Hatched	Instars I	II	III	IV	V	VI	VII	Total	Sex
A	20.9.1949	30.9.1949	23	137	181	31	46	38	—	456	♀
B	20.9.1949	1.10.1949	23	100	23	21	43	155	30	395	♀
C	20.9.1949	3.10.1949	24	83	27	—	—	—	—	134	♂
D	20.9.1949	2.10.1949	25	79	31	—	—	—	—	135	♂
E	20.9.1949	2.10.1949	25	104	27	—	—	—	—	156	♂
F	20.9.1949	2.10.1949	25	79	29	—	—	—	—	133	♂

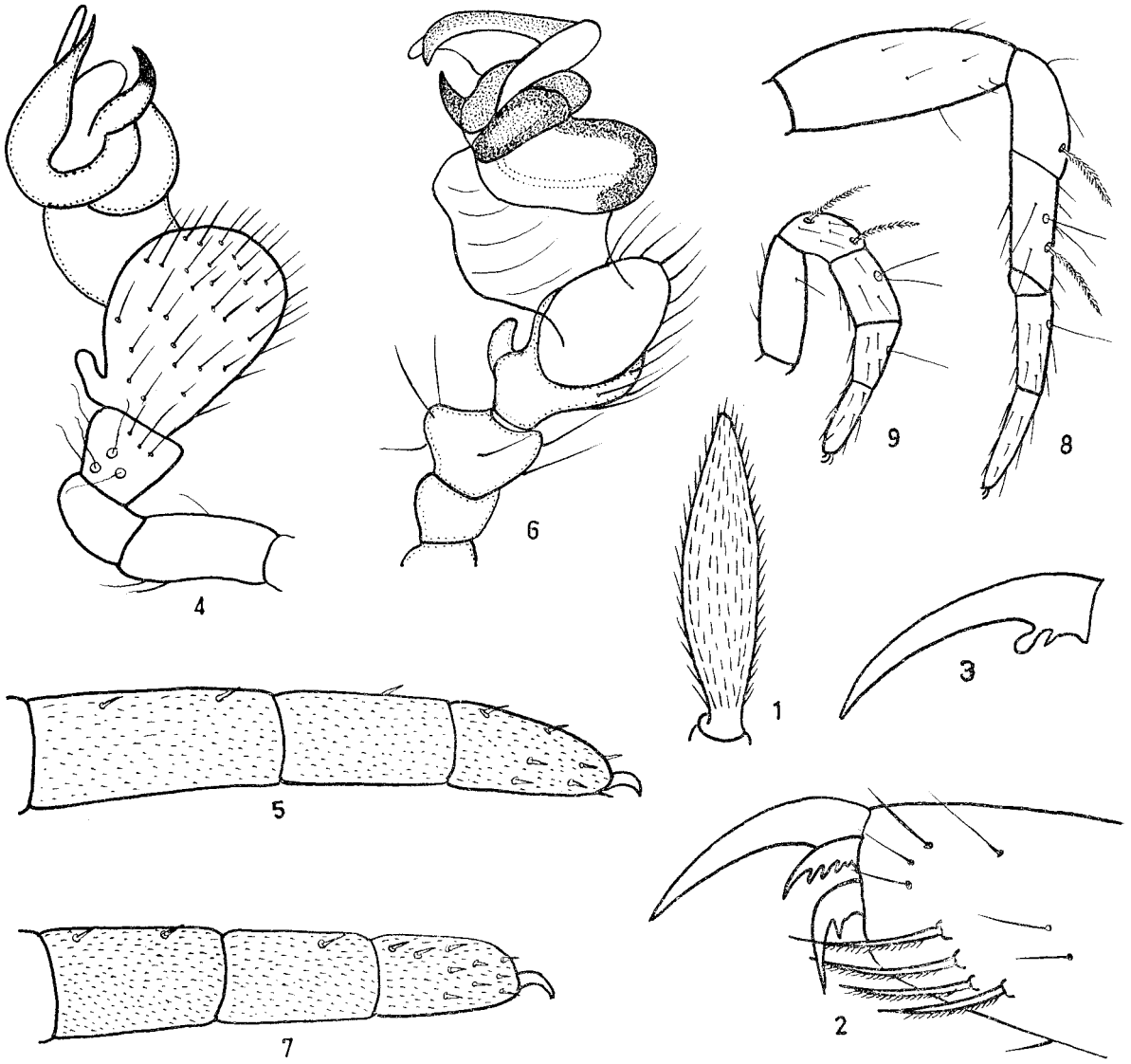
In summer the second instar remains in the egg-sac for about seven days. It then bites a hole in the tough outer wall and emerges. In specimens bred in the laboratory in October the duration of the second instar varied from 79 to 137 days (Table II). In the colder months of the year the duration is much longer and may last through the winter. The young in the same egg-sac do not all develop at the same rate. In an egg-sac collected in the field on 15 April 1969 the young were in the first instar. Some reached the second instar on 29 May 1969, but others did not do so until 30 June 1969, a difference of 32 days in the rate of development.

In the case of males the total number of juvenile instars passed through after hatching is three; in the case of females it is seven (Table II). One female specimen (A in Table II) reached the sixth instar but died before becoming mature.

From five egg-sacs made in the period 21 November 1950 to 30 January 1951, young, in the second instar, emerged after 57, 52, 49, 51 and 55 days respectively from the date when the egg-sac was made.

Sex-ratio: The 13 egg-sacs (Table I) made by the female collected on 24 October 1950 contained a total of 1630 eggs. Of these 188 failed to develop. The remaining 1442 gave rise to 724 males and 718 females, a sex-ratio of almost 1 : 1.

Longevity: The life-span under natural conditions is unknown. In the laboratory four males bred from eggs collected in the field lived, after becoming adult, for 250, 255, 564 and 619 days respectively. A female likewise bred in the laboratory lived for 426 days.



Figs. 1-5.—*Celaenia kinbergi* Thorell. 1, clavate hair. 2, claws of first leg. 3, retroclaw of first leg. 4, palpus of male with bulb extended. 5, three distal segments of front leg of first instar.
Figs. 6-7.—*Celaenia distincta* (O. Pick-Cambr.) 6, palpus of male with bulb extended. 7, three distal segments of front leg of first instar.
Figs. 8-9.—*Celaenia atkinsoni* (O. Pick-Cambr.). 8, second leg of second instar. 9, third leg of second instar.

Celaenia distincta (O. Pick-Cambr., 1869)
(Pl. 1, fig. 2)

According to Rainbow (1902) the single specimen on which Pickard-Cambridge based his description was an old and dry example labelled as coming from 'New Holland' and deposited in the Hope Collection, University Museum, Oxford. Over the past 100 years only one other specimen has been recorded. This is a female from Prospect, N.S.W. and is described by Rainbow (1902).

The spider occurs in Tasmania. A female with egg-sacs was found on the Domain, Hobart 15 January 1968, and another, also with egg-sacs, on 5 December 1968. A male, hitherto unknown, was bred from the eggs and is described hereunder.

MALE: Measurements in millimetres:

Body length	2.46
Length of carapace	1.14
Width of carapace	0.97
Length of abdomen	1.54
Width of abdomen	1.83
Height of abdomen	1.71

Leg	*Femur*	*Patella*	*Tibia*	*Metatarsus*	*Tarsus*	*Total*
1	1.38	0.63	0.73	0.40	0.27	3.41
2	1.38	0.59	0.77	0.42	0.31	3.47
3	0.68	0.30	0.38	0.30	0.27	1.93
4	0.73	0.31	0.52	0.38	0.25	2.19
Palp	0.22	0.16	0.14	—	0.36	0.88

Colour: Carapace dark brown with a wide median-Y-shaped yellowish band, the arms of the band extending one on each side of the head region. Ocular area and clypeus dull yellow. Eyes surrounded by black rims. Behind eyes a pair of triangular brown spots separated by a narrow median line. Two yellow radial stripes on each side of thoracic region. Margin yellow. Chelicerae, maxillae and labium brown. Sternum yellow with dark brown margin. Femora, patellae and basal half of tibiae dark brown above and on the sides, lighter below. Distal half of tibiae almost white. Metatarsi and tarsi light brown. Abdomen dull white above. Anterior surface with a dark median V-shaped mark, on each side of which the surface is brown with vertical rows of dark spots. A large dark area on each side of posterior half. Ventral surface dull white with light brown marks. Spinnerets light brown.

Carapace: Strongly narrowed in front. Ocular area projecting over clypeus. Eight eyes in two rows. Viewed from above front row appears strongly recurved, hind row slightly recurved. Ratio of eyes AME : ALE : PME : PLE = 6 : 5 : 6 : 5. AME separated from each other by twice their diameter and from ALE by 3/2 of their diameter. PME separated from each other by 5/3 and from PLE by 3/2 of their diameter. Median ocular quadrangle almost square. Lateral eyes contiguous. Three setae in a transverse row between AME and PME. Height of clypeus equal to once diameter of AME.

Chelicerae: Inclined slightly backward, conical, two teeth on retromargin of furrow, no scopula, fang curved and strongly serrate on basal half of inner margin.

Maxillae: Slightly converging with serrula on front margin and a light scopula on inner side. Outer side rounded.

Labium: Rounded in front, twice as wide as long, reaching about half the length of maxillae.

Sternum: Shield shape, longer than wide in ratio 9 : 8, truncate in front and ending in a blunt point between fourth coxae, margin slightly excavated round bases of second, third and fourth coxae, lightly clothed with barbed setae.

Legs: Length order 2.1.4.3. Lightly clothed with barbed hairs. First and second legs almost equal in length. Femora of first three pairs with two longitudinal rows of short stout spines on ventral surface. The spines in the row nearer the promargin larger than those in other row. On the distal two thirds of the dorsal surface of first and second femora there are small tooth-like spines at the base of the barbed setae. Patellae of first and second legs bent at right angles near base. A single trichobothrium on each metatarsus except the fourth, which has none, and six on the basal half of each tibia. The upper tarsal claws of first and second legs dissimilar, the proclaw being small with four teeth, the retroclaw large with two teeth near base. Lower claw strongly bent, with two teeth. Upper claws of third and fourth legs more nearly similar.

Palpi: Cymbium spoon-shaped with a small curved apophysis at the base on retrolateral side. In the specimen under examination the genital bulb is fully extended. The basal haematodocha is very large. There is a curved sharp median apophysis and the embolus is of the coniform type. (fig. 6). The tibia has six trichobothria, three on each side. The cymbium is lightly clothed with hairs.

Abdomen: Wider and higher than long, the highest part being in the anterior half. It rises steeply from front margin, which partly overlaps the carapace. The highest part forms a transverse rectangle, the hind margin of which is recurved. On each anterior corner of the rectangle are two large black clavate hairs and on each posterior corner a small conical tubercle directed backwards. The central area of the rectangle is depressed and has a pair of dark muscle spots. The posterior half of the dorsal surface slopes steeply to the hind margin and is marked with two pairs of muscle spots. At the sides the integument forms a series of folds, which become continuous above the spinnerets. The folds carry a number of black clavate hairs. The six spinnerets are conical, the anterior pair larger than the others.

BIOLOGY

Habits: As in the case of the preceding species the spider makes no web for the capture of prey. Its food consists entirely of night-flying moths. The two female specimens collected were found resting on their egg-sacs, which were attached to the dead branches of a prickly box tree.

Egg-sacs: A group of six egg-sacs was found 15 January 1968, and a group of three 5 December 1968, each about two metres above the ground. The sac is spherical and about 6.0 mm. in diameter. As the sacs are made the spider binds them into a close cluster and covers them with the scales and other remnants from the moths on which it has fed (Pl. fig. 2). The outer wall of the egg-sac is brown and paper-like. Within the wall is a layer of soft yellowish silk cover-

ing the egg-mass. Eggs or young from five separate sacs numbered 22, 29, 31, 33 and 42 respectively. Although the egg-sacs are brown, the silk threads binding them together and the moth scales covering them give them a grey appearance, which resembles that of the twigs and branches to which they are attached.

Immature stages and number of instars: The eggs are yellow and about 0.86 mm. in diameter. Since the egg-sacs were found in the field and not made under laboratory conditions, the duration of incubation and of the separate instars is not known accurately. From the three egg-sacs collected 5 December 1968, young in the second instar emerged on 15th, 16th, and 29th January 1969, respectively.

As in the other species an ecdysis takes place before or at the time of hatching and the exuviae are left behind in the crumpled chorion after the escape of the first instar.

The *first instar* has the following measurements in millimetres:

Body length	1.37
Length of carapace	0.63
Width of carapace	0.57
Length of abdomen	0.91
Width of abdomen	0.80

Leg	*Femur*	*Patella*	*Tibia*	*Metatarsus*	*Tarsus*	*Total*
1	0.42	0.22	0.24	0.16	0.19	1.23
2	0.42	0.25	0.23	0.16	0.19	1.25
3	0.22	0.16	0.19	0.16	0.19	0.92
4	0.26	0.20	0.23	0.15	0.19	1.03
Palp	0.14	0.10	0.11	—	0.16	0.51

Pale yellow in colour. Carapace not strongly narrowed in front. Chelicerae without teeth, fang short and conical. Integument of body and appendages covered with numerous minute spinules. Hairs and bristles absent, except for two short setae above each tibia, one above each metatarsus and several on each side of tarsi (fig. 7). Tarsal claw single and without teeth. Trichobothria absent. Abdomen broadly rounded, without tubercles and not elevated. Spinnerets present but not functional.

The *second instar* has the following measurements in millimetres:

Body length	1.43
Length of carapace	0.74
Width of carapace	0.74
Length of abdomen	0.86
Width of abdomen	0.86
Height of abdomen	0.86

Leg	*Femur*	*Patella*	*Tibia*	*Metatarsus*	*Tarsus*	*Total*
1	1.30	0.60	0.68	0.34	0.27	3.19
2	1.30	0.56	0.67	0.41	0.27	3.21
3	0.64	0.34	0.34	0.29	0.25	1.86
4	0.71	0.33	0.48	0.37	0.25	2.14
Palp	0.23	0.14	0.19	—	0.26	0.82

The second instar resembles the adult in coloration and general form. However, the carapace is not so strongly narrowed in front. On the tibia the legs have only two and the palpi only one trichobothrium. In the female two short conical tubercles represent the long tapering processes on the abdomen of the adult. At this stage there is little difference in the appearance of the sexes, except that the males already have enlarged palpi. The two pairs of large black clavate setae on the highest part of the abdomen in the adult male are present in both sexes of the second instar. Spinnerets are now functional and the young spiders able to spin their drag lines.

From a number of second instar specimens that emerged from an egg-sac on 15 January 1969, ten were isolated in small separate vivaria and maintained in the laboratory. Unfortunately all except two males died before reaching maturity. One of the males underwent ecdysis and became adult on 4 May 1969, the other on 7 May 1969. They lived until 3 December 1969, and died through the vivaria becoming overheated in sunshine.

Sex-ratio: In one egg-sac collected 15 January 1968 there were 23 males and 19 females, in another 20 males and 13 females. These numbers are too small to give a true indication of the sex ratio.

Celaenia atkinsoni (O. Pick-Cambr. 1879)
(Pl. I, figs 3 and 4)

The description of the female given by Pickard-Cambridge is adequate for the identification of the species. The spider is recorded from New Zealand and is now also reported from Tasmania.

All efforts to raise specimens to maturity in the laboratory failed and the male is still unknown.

BIOLOGY

Habits: The spider occurs on small shrubs and trees and usually about two metres from the ground. It does not make a web for the capture of prey but spins a few threads amongst leaves and twigs of the shrub for the attachment of its egg-sacs. It rests on a nearby leaf. During daytime the spider has its legs closely folded against the body, but at night it extends the first and second pairs ready to capture its prey, which consists entirely of small moths.

Egg-sacs: A female with six egg-sacs was found among the leaves at the top of some raspberry canes in a garden at New Town, 26 March 1969. Another female, also with six egg-sacs, was discovered among the leaves and berries on a Cotoneaster tree 13 April 1969. The egg-sacs bear a remarkable resemblance to dead and withered seed capsules or flower heads. They are somewhat spherical and produced into a stalk on one side. The spherical part varies in diameter from 3.31 - 4.56 mm. and the stalk varies in length from 3.4 - 4.0 mm. The outer wall of the sac has a number of small projections round the circumference. It is composed of densely woven brown silk and is very tough. Within the outer wall is a layer of soft light coloured silk surrounding the egg-mass. Unlike the two preceding species *C. atkinsoni* does not bind the egg-sacs into a close cluster. but suspends them separately on threads woven amongst the leaves of the shrub (Pl. I, fig. 4).

Immature stages and number of instars: The eggs are yellow and somewhat oval in shape measuring 0.85 mm. long and 0.80 mm. wide. Since no egg-sacs were made under laboratory conditions, the duration of incubation could not be determined accurately. From field observations, however, it appears to be about 25 days in late summer.

From some of the egg-sacs found on 13 April 1969 the young had already emerged. In three, however, they had not escaped. In one of these the chorion of the eggs had just split, in the second the young had hatched and were in the first instar, and in the third they were in the second instar and ready to emerge from the egg-sac. As in the preceding species one ecdysis takes place either before or at the time of hatching. The exuviae are left behind in the chorion, when the first instar hatches from the egg.

The *first instar* has the following measurements in millimetres:

Body length	1.09
Length of carapace	0.55
Width of carapace	0.52
Length of abdomen	0.82
Width of abdomen	0.71

Leg	*Femur*	*Patella*	*Tibia*	*Metatarsus*	*Tarsus*	*Total*
1	0.27	0.16	0.16	0.15	0.18	0.92
2	0.25	0.16	0.15	0.15	0.18	0.89
3	0.20	0.14	0.12	0.12	0.18	0.76
4	0.22	0.15	0.16	0.14	0.18	0.85
Palp	0.11	0.08	0.08	—	0.14	0.41

Coloration yellowish white, translucent. Carapace rounded in front. Eyes becoming pigmented. Chelicerae without teeth and with short conical fang. Integument of body and appendages covered with minute spinules. Hairs, bristles and spine absent except for two short setae above each tibia, one above each metatarus and about nine on each tarsus. Trichobothria absent. Abdomen broadly ovoid. Spinnerets not functional.

The *second instar* has the following measurements in millimetres:

Body length	1.03
Length of carapace	0.57
Width of carapace	0.51
Length of abdomen	0.68
Width of abdomen	0.57

Leg	*Femur*	*Patella*	*Tibia*	*Metatarsus*	*Tarsus*	*Total*
1	0.52	0.21	0.29	0.22	0.22	1.46
2	0.47	0.23	0.27	0.21	0.24	1.42
3	0.32	0.18	0.16	0.16	0.22	1.04
4	0.37	0.19	0.20	0.19	0.19	1.14
Palp	0.10	0.07	0.12	—	0.18	0.47

Coloration yellowish brown on cephalothorax and appendages, darker brown on each side of carapace and round margin of sternum. Femora brown on distal half of dorsal surface. Tibia brown at apex; metatarsi brown at base. Tarsi mainly brown. Abdomen white above, brown below. Spinnerets brown.

There is a marked difference from adult female in body form. Carapace not strongly narrowed anteriorly, the ocular area occupying the full width of front. A very large black barbed seta between PME and a slightly larger one (almost half the length of the carapace) at the hind end of head region. A transverse row of four white barbed setae on posterior half of thoracic region. Chelicerae with well developed fang and two teeth on retromargin of furrow. Ventral surface of first, second and third femora without the two longitudinal rows of short spines present in adult. A single large black barbed seta at the apex of first and second patella and also at both base and apex of third and fourth patella. A similar large seta at apex of first and second tibia but none on third and fourth (figs 8 & 9). One trichobothrium on first and second tibia, two on third and fourth; also one on each metatarsus, except the fourth, which has none. Three tarsal claws, upper pair similar with about four teeth; lower claw strongly bent and with one tooth. Palpi with one trichobothrium on tibia and four teeth on tarsal claw. Abdomen somewhat cordiform and without the large lateral lobes of the adult female. A small tubercle on each side of dorsal anterior third. A transverse row of four large black setae in front of tubercles. The median pair of setae about one third the length of the abdomen. On posterior half of dorsal surface two pairs of smaller black setae. Rest of surface lightly clothed with white barbed setae. Spinnerets are now functional and the spiderling able to spin.

In the second instar the palpi of the males are not obviously different from those of the female. At this stage therefore it is not possible to distinguish the sexes by this character and thus determine the sex-ratio.

Seven specimens newly emerged from an egg-sac were placed in separate vivaria in the laboratory. However, all efforts to raise them to maturity failed. They died before reaching the next instar. The number and duration of the instars is therefore unknown.

Male and female specimens of *Celaenia kinbergi* Thorell and *C. distincta* (O. Pick-Cambr.) and a female of *C. atkinsoni* (O. Pick-Cambr.) together with the egg-sacs of the three species will be lodged in the Australian Museum.

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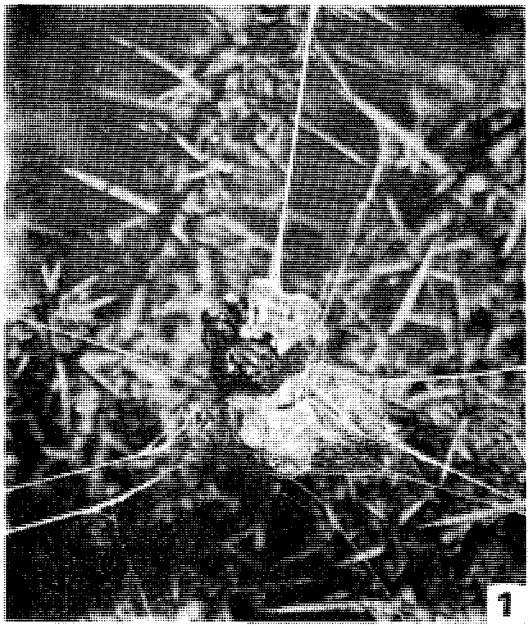

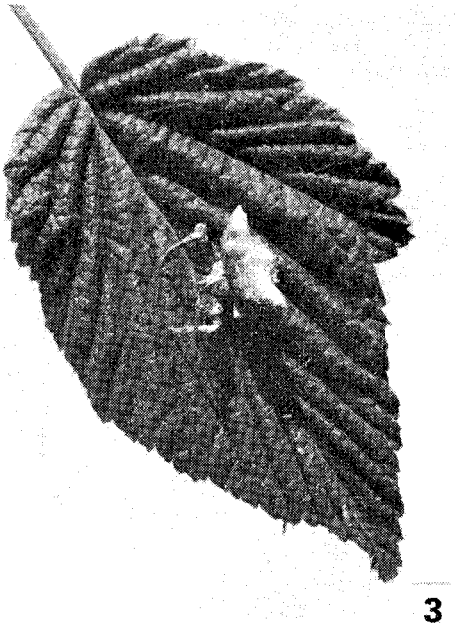

EXPLANATION OF PLATE 1

Fig. 1.—*Celaenia kinbergi* Thorell with egg-sacs.
Fig. 2.—*Celaenia distincta* (O. Pick-Cambr.) with egg-sacs.
Fig. 3—*Celaenia atkinsoni* (O. Pick-Cambr.) on a leaf.
Fig. 4.—*Celaenia atkinsoni* (O. Pick-Cambr.) with egg-sacs.