A new species of *Nearchus* (Insecta: Phasmida: Phasmatidae) from Borneo, and a description of the male of *N. redtenbacheri*

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Bragg, P.E. A new species of *Nearchus* (Insecta: Phasmida: Phasmatidae) from Borneo, and a description of the male of *N. redtenbacheri*.
Zool. Med. Leiden 69 (21), 29.xii.1995: 273-279, figs 1-11.— ISSN 0024-0672.
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Key words: *Nearchus foliatus*; *N. redtenbacheri*; Borneo; Kalimantan; Sabah; Mt Kinabalu.
Nearchus foliatus spec. nov. is described from a single female specimen collected in eastern Kalimantan in 1925. This species is readily distinguished from others in the genus by the large foliaceous lobes on the legs. A key to the genus is provided. The male and egg of *N. redtenbacheri* Dohrn are described for the first time; males of this genus have not been recorded previously.

Introduction

The genus *Nearchus* Redtenbacher, 1908 (family Phasmatidae Karny, 1923: 235) was established for two new species: *N. maximus* Redtenbacher from Laos, and *N. grubaueri* Redtenbacher from West Malaysia. *Nearchus redtenbacheri* Dohrn, 1910 was subsequently described from North Borneo (Dohrn, 1910: 409); Günther (1935: 10) treated this as a subspecies of *N. maximus* and described another new subspecies, *N. maximus mjobergi* Günther, 1935, also from Borneo.

The author has not examined type material of any species of *Nearchus* but has previously found several examples of Günther incorrectly synonymizing species. In view of this, and the geographical difference between the type localities of *N. maximus* and *N. redtenbacheri*, they are treated as distinct species in this paper.

All species are very large; recorded body lengths of females range from 206 mm for *N. grubaueri* to 300 mm for *N. redtenbacheri*. Despite their large size there appear to be few specimens in museums. Males and eggs of *Nearchus*, which were previously unknown, are found to be very similar to the closely related *Pharnacia* Stål, 1877.

Material

Examination of the collection at the Nationaal Natuurhistorisch Museum (RMNH) showed two specimens of the genus, one of *Nearchus grubaueri* and one previously undescribed species from Borneo. In addition the author and Mr Paul Jennings have each collected a specimen of *N. redtenbacheri* from Mt Kinabalu, Sabah; Mr Jennings successfully reared a male from eggs laid by his specimen.

Nearchus Redtenbacher, 1908

Nearchus Redtenbacher, 1908: 448; Dohrn, 1910: 409; Günther, 1935: 10.

Type species: *N. maximus* Redtenbacher, 1908, by present designation.

The following key to females of *Nearchus* is based mainly on the literature and should therefore be used with caution.

1. Praeopercular organ present on the hind margin of seventh sternite 2
- Without a praeopercular organ on the seventh sternite ..... ***N. grubaueri*** Redtenbacher, 1908
2. Middle and hind legs with large leaf-like lobes on femora and tibiae, mesonotum and metanotum with lateral spines ..... ***N. foliatus* spec. nov.**
- Legs with teeth or triangular serrations but without foliaceous lobes; thorax without lateral spines 3
3. No teeth on fore tibiae, hind tibiae with three rows of teeth ..... ***N. maximus*** Redtenbacher, 1908
- Small teeth on front tibiae, hind tibiae with five rows of teeth 4
4. Fore tibiae about one third of the length of the body .. ***N. redtenbacheri*** Dohrn, 1910
- Fore tibiae just over half the length of the body ..... ***N. maximus mjobergi*** Günther, 1935

Nearchus foliatus spec. nov.

Material.— Holotype: ♀ (RMNH), "Midden O-Borneo, H.C. Siebers, 21.viii.1925".

This species is readily distinguished from other members of the genus by the foliaceous legs.

Female (figs 1-5).— The specimen has suffered some damage: the right fore leg is missing (glue on the joint and side of head indicate it was originally present), part of the left fore tarsus and most of both antennae are missing, the apex of the abdomen and base of the operculum appear to have been laterally compressed during preservation.

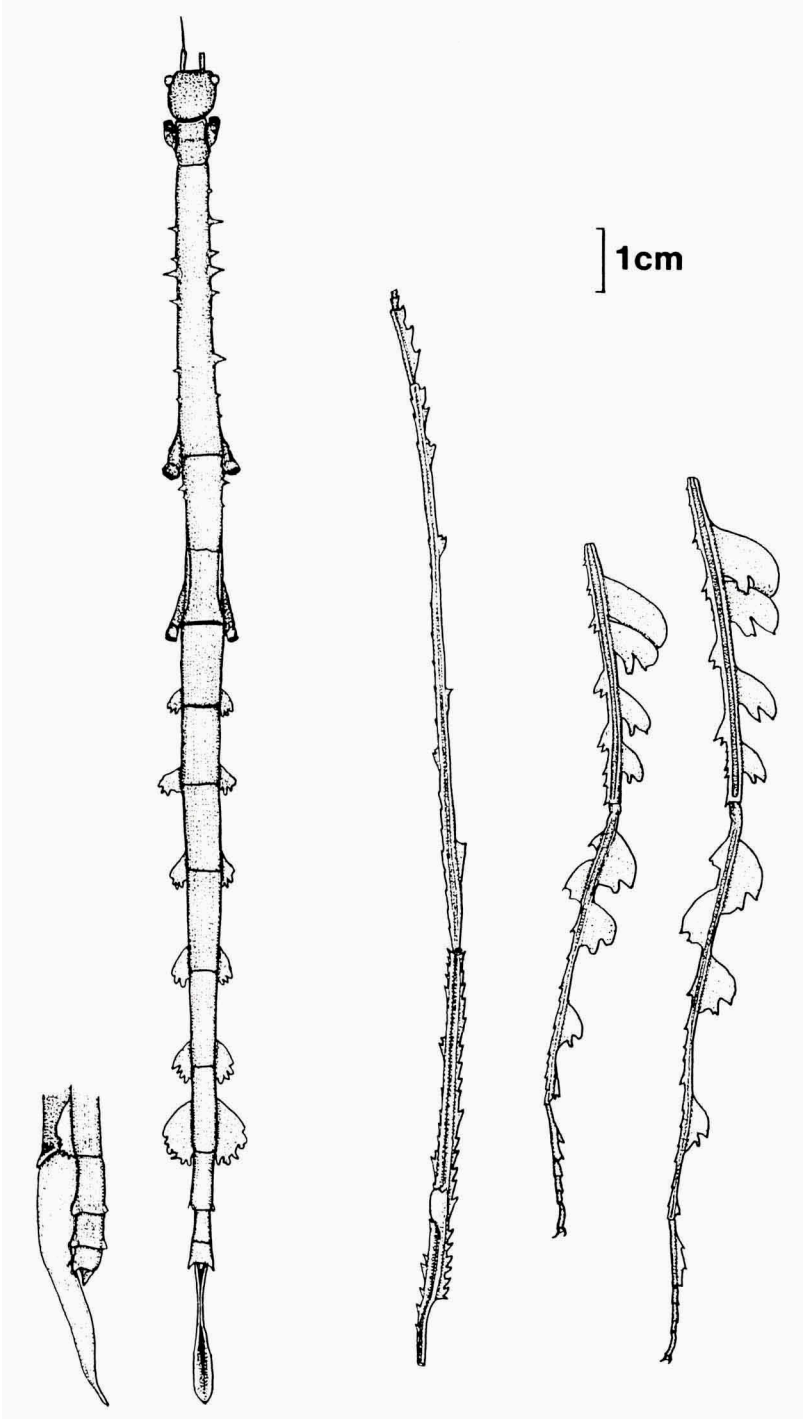
Specimen almost uniformly mid-brown with the head and pronotum lighter brown, when alive the specimen may have been either green or brown. Body smooth, length (including operculum) 212 mm, overall length (including legs) slightly in excess of 407 mm (fore tarsus broken), width at widest point (posterior of mesonotum) 7.5 mm. Measurements are given in table 1.

Antennae broken, basal segment dorso-ventrally flattened, 2-3 times longer than subsequent segments. Head rounded, smooth.

Pronotum short, only slightly longer than wide, with a shallow median transverse groove; lateral margins slightly raised.

Mesonotum long, widening only slightly towards the posterior; smooth dorsally, lateral margins armed with spines. Five medium to large spines on each side appear to be more or less paired, with 2-5 small spines irregularly positioned on each side. Lateral margins of metanotum each with three small spines.

Median segment with small median tubercule on the hind margin, otherwise unarmed. Abdominal segments 2-10 with leaf-like lateral expansions at the posterior of the lateral margins; large on 2-6, very large on 7, small on 8-9, minute on 10; lobes with smooth anterior and lateral margins, posterior serrated. Segments 1-9 with a median tubercule on the hind margin. Hind margin of tenth segment indented, with



Figs. 1-5. *Nearchus foliatus* spec. nov., holotype. 1, operculum, lateral view; 2, body, dorsal view; 3, left fore leg; 4, left mid leg; 5, left hind leg.

small postero-lateral spines. Lamina supraanalis short, rounded. Praeopercular organ on 7th sternite formed by two triangular lobes; sternites otherwise unarmed. Operculum rugulose, deep, elongated, projecting 22 mm beyond the end of the abdomen (fig. 1). Cerci slender, densely setose, as long as 10th segment.

Mid legs reaching to end of the 8th abdominal segment, hind legs reaching beyond the operculum. All tibiae longer than femora. Fore femora with dorsal surface reduced and almost on the same plane as posterior surface (this is typical of *Nearchus* and *Pharnacia* Stål).

Base of fore femora compressed and incurving, dorsoposterior carinae with one large foliaceous lobe, dorso-anterior with numerous triangular serrations, ventro-posterior with several medium and numerous small serrations, ventro-anterior and medio-ventral carinae unarmed. Middle and hind femora with dorsoposterior carinae each with four large foliaceous lobes, ventro-anterior and ventro-posterior carinae with serrations and lobe-like serrations dorso-anterior and medio-ventral carinae distinct but unarmed.

Fore tibia with triangular lobes on both posterior carinae, dorso-anterior carina serrated, ventro-anterior carina unarmed. Middle and hind tibiae with dorsoposterior carinae bearing three large foliaceous lobes; medio-ventral carinae serrated, with a large triangular lobe and a large foliaceous lobe near the base; ventro-anterior carinae with only a few serrations; ventro-posterior carinae with one large and one medium foliaceous lobe and several serrations; dorso-anterior carinae unarmed.

Basal segment of all tarsi longer than tarsomeres 2-4, with a tri-serrate lobe dorsally and tri-serrate on each lateral surface (except left mid tarsus which is bi-serrate); second and third tarsomeres with only small lobes dorsally.

Nearchus redtenbacheri Dohrn, 1910

Nearchus redtenbacheri Dohrn, 1910: 409; Günther, 1935: 11 [referred to as a subspecies of *N. maximus* Redtenbacher]. Holotype: ♀ (Stettin) North Borneo, coll. Waterstradt.

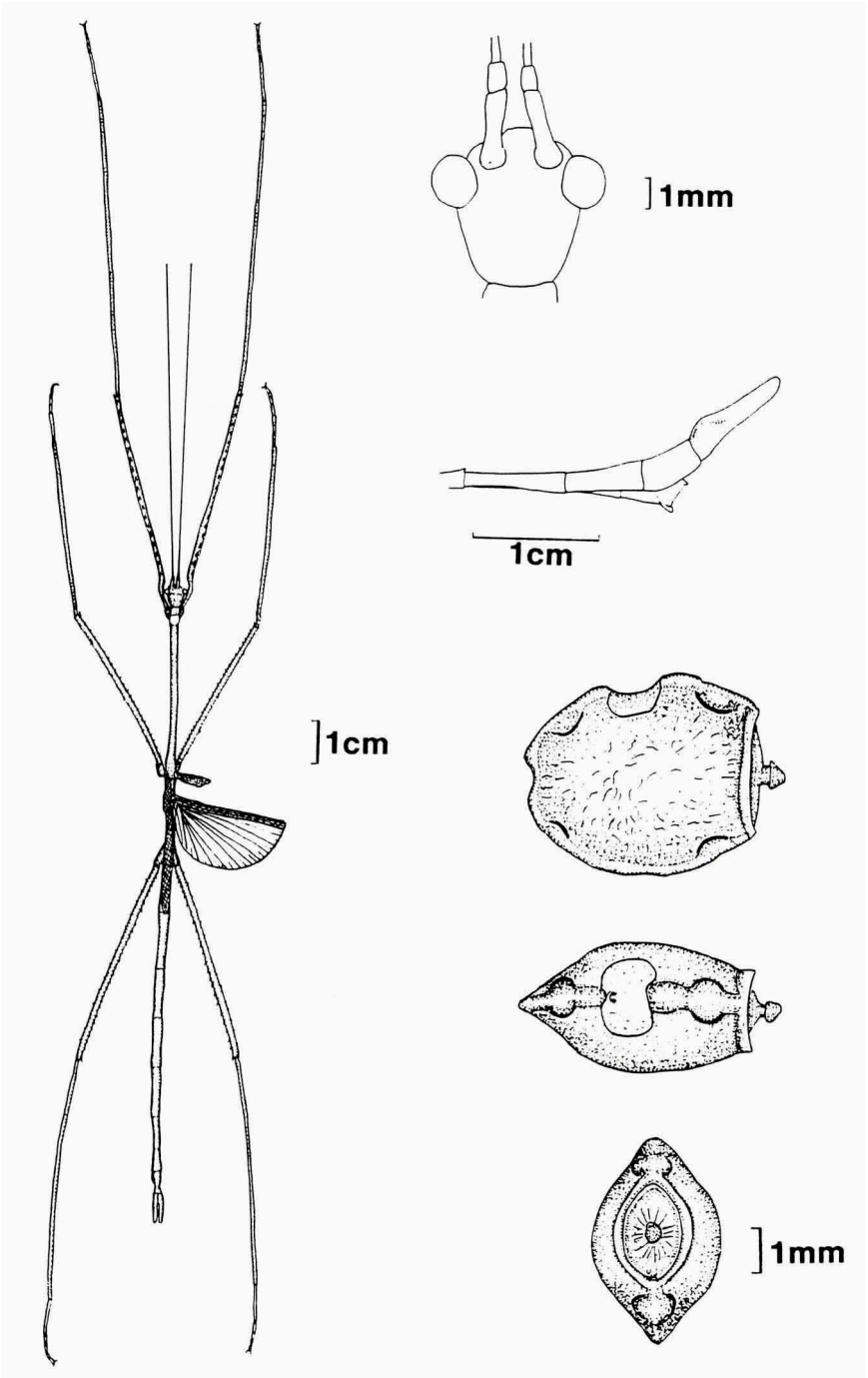
Material.— ♀ (PEB-1720), Sabah, Kinabalu National Park, near Park Headquarters, 1580m, P.E. Bragg, 30.viii.1992; ♀ (P. Jennings collection), same locality, P. Jennings, viii.1990; ♂ (P. Jennings collection), captive reared from female collected viii.1990; ♀ (BMNH, 1964-250) Sabah, Mt Kinabalu, Mesilau, J. Smart, Royal Society Expedition, 06-02-1964.

Male (figs 6-8).— Similar to *Pharnacia serratipes* (Gray), but more slender and lacking black stipes on the side of the mesonotum and on costal region of the wing.

Head, body, legs, antennae and costal region of wings mid green; dorsal surface of body and elytra greenish brown; anal region of wing light grey with brown veins. Body smooth, carinae of all femora and tibiae armed with serrated spines. Measurements are given in table 1.

Antennae reaching to half way along the tibiae, very setose, basal segment dorsoventrally flattened, 2nd segment very short. Head almost a trapezium, narrower at the rear; flattened, smooth, eyes prominent (fig. 7).

Pronotum short, with a distinct median transverse groove; lateral and anterior margins slightly raised. Mesonotum long, widening only very slightly at the posterior. Metanotum very short.



Figs. 6-11. *Nearchus redtenbacheri* Dohrn; 6-8, male; 9-11, egg. 6, dorsal view of male; 7, head, dorsal view; 8, apex of abdomen, lateral view; 9, lateral view; 10, dorsal view; 11, opercular view.

Median segment twice as long as metanotum. Dorsal surface of abdominal segments very sparingly setose, lateral and ventral surfaces setose; posterior margin of 5th segment with a tubercule. Tenth segment with two long lobes, each with hooked spines on the interior surface. Poculum deep and angular, with a backward pointing spine-like lobe on the angle (fig. 8).

Elytra slender, just covering the base of the wings. Wings reaching to end of second abdominal segment.

Mid legs reaching beyond the end of the abdomen. All tibiae longer than femora.

Base of fore femora compressed and incurving; dorso-anterior carina with large triangular serrations, dorsoposterior with a few strong setae; ventro-anterior densely covered with strong setae; ventro-posterior with spine-like serrations; medio-ventral finely setose; apex of ventro-posterior with a forward pointing spine. Fore tibiae with five distinct carinae; all carinae setose, postero-ventral with a few spinose serrations.

Middle and hind femora with all five carinae setose, all anterior and posterior carinae serrated; apices of ventro-anterior and ventro-posterior carinae with distinct spine. Middle and hind tibiae with all five carinae with spinose serrations, and setose.

Basal segment of all tarsi longer than the combined length of all subsequent segments.

Egg (figs 9-11).— Capsule basically a laterally compressed sphere; slightly longer than high, indented at the opercular end. Capsule and operculum slightly rugulose, mid brown in colour; micropylar plate very pale brown or cream. Capsule with a slight keel on dorsal and ventral surfaces, and across polar end but not over the micropylar plate; there is a rim surrounding the operculum. Ventral and dorsal sur-

Table 1. Measurements of the holotype of *N. foliatus* spec. nov. and *N. redtenbacheri* Dohrn (female from the author's collection).

Lengths (mm)	*N. foliatus*	*N. redtenbacheri*	
		♀	♂
Body (including operculum)	214	284	-
Body (excluding operculum)	192	249	146
Antennae	>9	>67	78
Head	12	9.5	4.5
Pronotum	7	8	4
Mesonotum	47	56.5	36
Metanotum	16	18	7
Median segment	12	19.5	15
Fore femur	70	76-78	51-53
Fore tibia	96	107	69
Fore tarsus	>17	24-28	18
Mid femur	45-46	57	38
Mid tibia	52	65-66	42
Mid tarsus	22	21-24	14.5
Hind femur	55-56	67-68	47-48
Hind tibia	69-70	84-85	55-57
Hind tarsus	24	24	15-15.5
Operculum	41	62	-

faces of keel each with a rounded swelling near the operculum, and a smaller swelling near polar the end. Micropylar plate slightly bilobed, wider than long; micropyle at the polar end of plate. Operculum oval, slightly convex with a central dark brown capitulum. Typical measurements: capsule length 5.5 mm, height 4.5 mm, width 3.0 mm, capitulum length (dehydrated) 0.6 mm.

This is the first specific locality to be recorded for this species. The species is not rare, the author has encountered three female specimens over a total of eight nights at this locality. In addition to the material listed above, Mr C.L. Chan of Kota Kinabalu, has several specimens from this locality which he has collected over a period of several years, and there is a female specimen on display in Kinabalu Park Head Quarters. Measurements of the female collected by the author are given in table 1.

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Received: 13.vii.1995
Accepted: 20.vii.1995
Edited: C. van Achterberg