Pacific Insects 11 (1): 49-70 20 February 1969

ARADIDAE IN THE BISHOP MUSEUM, HONOLULU, IV.

(Hemiptera-Heteroptera)[1]

By Nicholas A. Kormilev

BISHOP MUSEUM, HONOLULU

Abstract: This paper covers the revision of the Oriental, Australian and South Pacific species of the genus *Carventus* Stål, 1865. *Camerarius* Distant, 1902, previously synonymized with *Carventus* Stål by Usinger & Matsuda, is revalidated as a genus. Included are descriptions of 15 new species of *Carventus* Stål and 2 new species of *Camerarius* Distant, and redescriptions of *Carventus denticollis* Stål, 1873 (type species of *Carventus*), *Crimia pallescens* Walker, 1873 (type species of *Camerarius*), and *Carventus stali* Bergroth, 1889, the type of which was examined. *Carventus elegantulus* Kormilev, 1967 is synonymized with *Carventus denticollis* Stål, 1873. *Carventus stali* Bergroth, 1889, is transferred to *Camerarius* Distant, and *Camerarius wappersi* Kormilev, 1953, is synonymized with the former. *Carventus kirkaldyi* China, 1930, *Carventus milleri* Korm., 1967, *Carventus borneensis* Korm., 1967, and *Carventus peterseni* Korm. 1967, are transferred to *Camerarius* Distant. A key has been constructed for Oriental, Australian and South Pacific species of *Carventus*, with the exception of 3 species whose types could not be located, and descriptions of which are not sufficient. Also constructed was a key for all species of *Camerarius* Distant.

This paper treats the remainder of the subfamily Carventinae not covered in my previous paper (*Pacif. Ins.* **10** (3-4): 575-597). Genera treated are *Carventus* Stål, 1865, and *Camerarius* Distant, 1902. The genus *Carventus* Stål was established in 1865, but the first species, *Carventus denticollis* Stål was described later in 1873. In 1902, Distant in revising the Aradid species described by Walker, proposed the genus *Camerarius* Distant for the reception of *Crimia pallescens* Walker, 1873.

Carventus Stål and *Camerarius* Distant are closely related, but still may be easily separated by the shape of the pronotum: anterolateral angles rounded, or subangular in *Carventus*, but bi-, or trilobate, in *Camerarius*. I have considered them as subgenera of *Carventus*. Usinger & Matsuda synonymized *Camerarius* Distant with *Carventus* Stål (1959: 120) reasoning "that the groups are not correlated with distribution pattern or other attributes that might justify separation." There is, however, a character which may justify the separation of *Camerarius* as a different genus from *Carventus*.

In *Carventus*, the males have on both sides of sternum VII 2 (1+1) small tubercles, or swellings, which are absent in *Camerarius*. The grade of development of these glabrous

1. Material examined is a result of fieldwork supported by grants to Bishop Museum from the U. S. National Science Foundation (G 2127, 4774, 1073) and the U.S.A.M.R.D.C. (DA-MEDDH-60-1) and a grant to J. L. Gressitt from the J. S. Guggenheim Foundation (1955-56).

For previous parts of this series, see *Pacif. Ins.* **9** (3): 447-79; **10** (2): 249-60; **10** (3-4): 575-97.

swellings, or tubercles, differs in different species, but they are always present. In *Carventus minutus* Kormilev, *C. biroi* Korm. and *C. robustus* Korm., the swellings are high and slim, flattened on top, (in some species the top is wider than the stem, resembling a mushroom with a flattened hood). In others, i.e. *C. horvathi* Kormilev, *C. taiwanicus* n. sp., *C. depressus* n. sp., they resemble a low bubble. In *C. denticollis* Stål it is like a square swelling. Only in *C. elongatus* Kormilev from Australia are they considerably reduced and difficult to observe, but yet discernible. Usinger & Matsuda have observed this phenomenon, but they say "seventh ventral segment in males sometimes developed into prominent glabrous lobes midway between middle and lateral margins, these lobes totally lacking in other species."

This phenomenon of 2 tubercles with different degrees of development on the 7th sternite in males has also been observed in some other genera of Carventinae. Either swellings or tubercles, were found in all examined species of *Carventus* (at least in all Oriental and Australo-Pacific species), but they are missing completely in *Camerarius*. This character with the different shape of the pronotum justify treating them as 2 different genera.

Carventus Stål is widely distributed in the Oriental and Australian Regions and in the South Pacific. Its limits extend from Burma, Viet Nam, South China, Taiwan, and Philippines, across Indonesia, and New Guinea and its adjacent islands, to Australia and Tasmania in the south, and Fiji and Samoa in the South Pacific. One species of *Carventus* was recorded from Mexico, and a number of species, previously referred to the genus *Burgeonia* Schouteden, 1919, were recorded from tropical Africa and Madagascar.

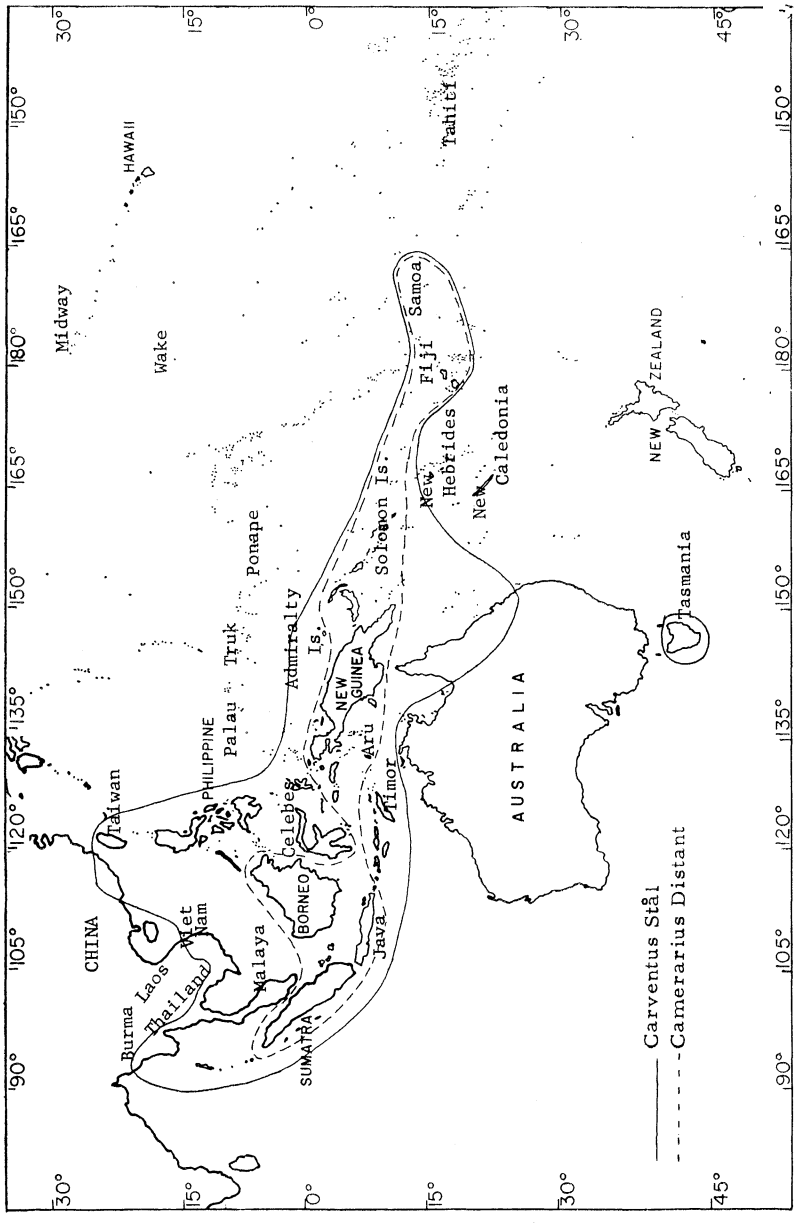
Usinger & Matsuda synonymized *Burgeonia* with *Carventus* (1959 : 120), and Hoberlandt concurs with it. *Carventus mexicanus* Bergroth, 1895, is a true *Carventus*.

Camerarius Distant is not as widely distributed, being found in Sumatra in the west, across Indonesia and New Guinea to the Bismarck Archipelago, Solomon Is., Fiji and Samoa.

I was able to examine types of *Carventus denticollis* Stål, and *Carventus ståli* Bergroth, and received data from the British Museum which permitted me to identify *Camerarius pallescens* (Walker). Consequently, the following changes are proposed: *Carventus elegantulus* Kormilev, 1967, is identical to *Carventus denticollis* Stål, and must be synonymized with the latter. *Carventus ståli* Bergroth, 1889, *Carventus kirkaldyi* China, 1930, *Carventus milleri* Kormilev, 1967, *Carventus borneensis* Korm., 1967 and *Carventus peterseni* Korm., 1967, should be transferred to *Camerarius* Distant. *Camerarius wappersoni* Kormilev, 1954, is identical to *Camerarius ståli* (Bergroth), and must be synonymized with it.

Three species referred to as *Carventus* I neither could examine, nor obtain sufficient data, so I have excluded them from my key. They are: *Acorium griseolum* Signoret, 1880, transferred by Lethierry & Severin to *Carventus* (1896 : 39), and *Carventus gestroi* Bergroth, 1892 (in Museo Civico di Storia Naturale in Genova); and *Carventus illitus* Bergroth, 1894, supposedly it is in the collection of Montandon, but I could not find out where it is now.

To the already recorded species, 15 species must be added to *Carventus* and 2 to *Camerarius*, All these species are described in this paper. The last 2 species of *Camerarius* are rather aberrant, particularly the one from New Guinea, with advanced reduction of the anterolateral lobes of the pronotum. The other species from Fiji is clearly inter-



Distribution of Carventus and Camerarius

mediate between *Camerarius* and species from New Guinea, so I referred them both to *Camerarius*.

Acknowledgments: Thanks are extended to Dr J. Linsley Gressitt, Chairman of Entomology, and Dr Peter D. Ashlock, formerly in charge of Hemiptera, at the B. P. Bishop Museum, Honolulu, Hawaii, for the privilege of studying unidentified specimens of Aradidae. I am also indebted to Dr William J. Knight and Mrs G. M. Black of the British Museum (Nat. Hist.), by whose courtesy I received the necessary data on the type of *Camerarius pallescens* (Walker); to Dr Per Inge Persson, Keeper of Entomology, at the Naturhistoriska Riksmuseum, Stockholm, and Dr H. Synave, Assistant at Institut Royal des Sciences Naturelles de Belgique, Brussel, by whose courtesy the types of *Carventus denticollis* Stål were loaned for examination, and *Camerarius ståli* (Bergroth) respectively, and to Dr Delfa Guiglia of the Museo Civico di Storia Naturale, Genova, for trying to find the types of *Carventus griseolus* (Signoret) and *Carventus gestroi* Bergroth.

Subfamily CARVENTINAE (continued).

Genus **Carventus** Stål, 1865

Oriental, Australian and South Pacific species of *Carventus* Stål may be separated by the following key:

Key to species of Carventus Stål

1 (2). Spiracles II lateral and visible from above 2
Spiracles II ventral, or sublateral, but not visible from above 3
2 (1). Micropterous, hemelytra reduced to small pads (Samoa)..... **zimmermani***
Macropterous, hemelytra complete (Malaya Pen.) ..... **malayensis** Kormilev, 1966
3 (1). Spiracles III to V dorsal 4
Spiracles III to V lateral, or ventral 6
4 (3). Spiracles VI to VII lateral, VIII dorsolateral; narrow species, ratio length/width of pronotum as 3 : 4, (Mysol, New Guinea) ..... **denticollis** Stål, 1873
Spiracles VI to VIII lateral; wider species, ratio length/width of pronotum as 2.5 : 4 5
5 (4). Antennal segment I distinctly shorter than III (13 : 15.5) (Viet Nam)..... **vietnamensis***
Antennal segment I as long as III (12.5 : 12.5) (Philippines) ..... **philippinensis***
6 (3). Spiracles III ventral.....7
Spiracles III lateral 10
7 (6). Spiracles IV ventral.....8
Spiracles IV lateral 9
8 (7). Micropterous, hemelytra reduced to small pads (Tasmania)...**brachypterus** Kormilev, 1966
Macropterous, hemelytra fully developed, (Australia) ..... **elongatus** Kormilev, 1965
9 (7). Head distinctly longer than width across eyes (15.5 : 13.5); exterior border of connexivum VII pale yellow (Lombok I.)..... **luteomarginatus** Kormilev, 1955
Head as long as width across eyes (21.5 : 21.5); connexivum VII concolorous with other segments (Philippines)..... **longiventris** Kormilev, 1967
10 (6). Head longer than width across eyes..... 11
Head at most as long as width across eyes 15

* Described as new.

11 (10). Anterior process of head produced beyond tip of ant. segm. I (New Guinea)...**longiceps***
Anterior process reaching at most 5/6 of antennal segment I 12
12 (11). Anterior process long, reaching at least 3/4 of antennal segment I.....13
Anterior process short, reaching at most 3/5 of antennal segment I 14
13 (12). Antennal segment I as long as III (14 : 14), (Celebes) ..... **speculifer** Bloete, 1965
Antennal segment I distinctly shorter than III (13 : 15), (New Guinea) ..... **papuasicus***
14 (12). Antennae more than 2× as long as head's width across eyes (43 : 19), (New Guinea)..... **gracilis***
Antennae 2× as long as head's width across eyes (38 : 19), (Admiralty Is.) ... **depressus***
15 (10). Head as long as width across eyes.....16
Head shorter than width across eyes.....18
16 (15). Antennal segment I longer than III; larger species, over 6.5 mm, (Bismarck Arch.) ..... **oviventris** Kormilev, 1967
Antennal segment I shorter than III; smaller species, less than 6.0 mm 17
17 (16). Antennal segment II 1/2 as long as III (4.5 : 9), (New Guinea) ..... **horvathi** Kormilev, 1954
Antennal segment II more than half as long as III (7 : 12.5), (New Guinea)..... **gressitti***
18 (15). Anterior process of head short, reaching at most 2/3 of antennal segment I..... 19
Anterior process longer, reaching at least 3/4 of antennal segment I 23
19 (18). Smaller species, less than 4.0 mm (♂), (Fiji) ..... **minusculus***
Larger species, more than 4.25 mm (♂) 20
20 (19). Antennal segment I longer than III 21
Antennal segment I as long as III..... 22
21 (20). Antennal segment I 2× as long as II (10 : 5), (Fiji) ..... **robustus** Kormilev, 1966
Antennal segment I less than 2× as long as II (8.5 : 5.5), (China)..... **sinensis***
22 (20). Antennal segment III as long as IV (9 : 9), (New Guinea) ..... **biroi** Kormilev, 1954
Antennal segment III much longer than IV (12.5 : 8.5), (Fiji).....**ovatus** Kormilev, 1965
23 (18). Larger species, both sexes over 5.0 mm 24
Smaller species, both sexes less than 5.0 mm.....26
24 (23). Genae contiguous in front of clypeus, anterior process slightly incised anteriorly; posterior border of connexivum VII strongly convex; PE-VII blunt, slightly shorter than tips of paratergites (Taiwan) ..... **taiwanensis***
Genae distinctly divergent in front of clypeus, anterior process bifurcate; posterior border of connexivum VII straight; PE-VII acute and produced beyond tips of paratergites 25
25 (24). Larger species, both sexes over 5.5 mm; hypopygium with a small triangular, median ridge at base of upper side, (New Guinea) ..... **stolidus***
Smaller species, both sexes less than 5.5 mm; hypopygium with median ridge reaching tip of hypopygium, (New Guinea)..... **crassus***
26 (23). Lateral ridges of fore disc of pronotum flattened, paratergites bilobate apically (♀), scutellum with a large, black spot apically, (Bismarck Arch.)..... **variegatus***
Lateral ridges of fore disc of pronotum raised, prominent; paratergites simple, not bilobate (♀); tip of scutellum without black spot..... 27
27 (26). Head slightly shorter than width across eyes (17 : 18); segment IX (♀) rounded posteriorly, (Australia)..... **australis** Kormilev, 1958
Head distinctly shorter than width across eyes (15 : 18)..... 28
28 (27). Larger, over 4.0 mm; anterolateral angles of pronotum slightly produced sideways, (Philippines) ..... **quatei***
Smaller, less than 3.75 mm; anterolateral angles of pronotum distinctly produced sideways, (Bismarck Arch.)..... **minutus** Kormilev, 1955

Table 1. Distribution of Oriental, Australian South Pacific species of *Carventus*.

No	Name	Burma	Viet Nam	Malaya	Java	Celebes	China	Taiwan	Philippines	New Guinea	Bismarck	Fiji	Samoa	Australia	Tasmania
1	gestroi Bergroth, 1892	*	—	—	—	—	—	—	—	—	—	—	—	—	—
2	vietnamensis*	—	*	—	—	—	—	—	—	—	—	—	—	—	—
3	malayensis Korm., 1966	—	—	*	—	—	—	—	—	—	—	—	—	—	—
4	illitus Bergroth, 1894	—	—	—	*	—	—	—	—	—	—	—	—	—	—
5	luteomarginatus Korm., 1955	—	—	—	*	—	—	—	—	—	—	—	—	—	—
6	speculifer Bloete, 1965	—	—	—	—	*	—	—	—	—	—	—	—	—	—
7	sinensis*	—	—	—	—	—	*	—	—	—	—	—	—	—	—
8	taiwanensis*	—	—	—	—	—	—	*	—	—	—	—	—	—	—
9	philippinensis*	—	—	—	—	—	—	—	*	—	—	—	—	—	—
10	quatei*	—	—	—	—	—	—	—	*	—	—	—	—	—	—
11	longiventris Korm., 1967	—	—	—	—	—	—	—	*	—	—	—	—	—	—
12	denticollis Stål, 1873	—	—	—	—	—	—	—	—	*	—	—	—	—	—
13	depressus*	—	—	—	—	—	—	—	—	*	—	—	—	—	—
14	biroi Kormilev, 1954	—	—	—	—	—	—	—	—	*	*	—	—	—	—
15	horvathi Kormilev, 1954	—	—	—	—	—	—	—	—	*	—	—	—	—	—
16	griseolus (Sign.), 1880	—	—	—	—	—	—	—	—	*	—	—	—	—	—
17	gracilis*	—	—	—	—	—	—	—	—	*	—	—	—	—	—
18	gressitti*	—	—	—	—	—	—	—	—	*	—	—	—	—	—
19	longiceps*	—	—	—	—	—	—	—	—	*	—	—	—	—	—
20	papuasicus*	—	—	—	—	—	—	—	—	*	—	—	—	—	—
21	crassus*	—	—	—	—	—	—	—	—	*	—	—	—	—	—
22	stolidus*	—	—	—	—	—	—	—	—	*	—	—	—	—	—
23	minutus Kormilev, 1955	—	—	—	—	—	—	—	—	*	*	—	—	—	—
24	oviventris Korm., 1967	—	—	—	—	—	—	—	—	—	*	—	—	—	—
25	variegatus*	—	—	—	—	—	—	—	—	—	*	—	—	—	—
26	ovatus Kormilev, 1966	—	—	—	—	—	—	—	—	—	—	*	—	—	—
27	robustus Kormilev, 1966	—	—	—	—	—	—	—	—	—	—	*	—	—	—
28	minusculus*	—	—	—	—	—	—	—	—	—	—	*	—	—	—
29	zimmermani*	—	—	—	—	—	—	—	—	—	—	—	*	—	—
30	australis Kormilev, 1958	—	—	—	—	—	—	—	—	—	—	—	—	*	—
31	elongatus Kormilev, 1965	—	—	—	—	—	—	—	—	—	—	—	—	*	—
32	brachypterus Korm., 1966	—	—	—	—	—	—	—	—	—	—	—	—	—	*
	Total	1	1	1	2	1	1	1	3	12	4	3	1	2	1

Note: Due to lack of space in the table some small islands were added to their larger neighbours, so Lombok is included with Java; Mysol and Admiralty Is. included with New Guinea, and Deslak I. with Bismarck Archipelago.

It is interesting to mention that micropterous species were recorded from extreme limits of distributional area of *Carventus*: Samoa and Tasmania.

Analyzing the distributional pattern of *Carventus* species one finds that one third of all species are recorded from New Guinea and its adjacent islands, and heading north, west, east or south the number of species declines rapidly.

Carventus zimmermani Kormilev, new species Fig. 1-2.

♂. Ovate, micropterous, covered with light brown incrustation.

Head shorter than width across eyes (22 : 25)[2]. Anterior process robust, tapering and incised in front, genae being longer than clypeus and contiguous in front of the latter, reaching 3/5 of antennal segment I. Antenniferous tubercles dentiform, convex outside and divaricating. Eyes large, semiglobose. Postocular tubercles dentiform, slightly produced beyond outer border of eyes. Vertex raised medially. Antennae robust; relative length of antennal segments I to II (III and IV missing), are: 12 : 6.5 : — : —. Labium reaching hind border of labial groove. *Pronotum* much shorter than its maximum width (21 : 37.5); fore lobe narrower than hind lobe (33 : 37.5). Collar robust, slightly sinuate in front; anterolateral angles convex anteriorly and laterally forming rounded lobes carinate along border, produced forward beyond collar and laterally; lateral tooth robust, produced beyond anterolateral angles, or humeri; just behind collar with a transverse ridge. Fore disc uneven and granulate, with 2 (1+1) oblique, granulate ridges at base of anterolateral angles; middle with short median sulcus, and interlobal depression with a stout tubercle placed on a short, transverse ridge. Hind disc sloping forward and backward, humeri roundly produced sideways; along hind border extends a row of fine granules. *Scutellum* short and wide (11 : 17.5), widely rounded posteriorly; basal border sinuate, disc raised and granulate, with a short median ridge. *Hemelytra* reduced to small pads, hind wings absent. *Abdomen* shorter than its maximum width across segment IV (62 : 66); terga I and II completely fused together and separated from metanotum by a thin, sinuous carina; central dorsal plate consisting of terga III to VI fused together and raised medially; tergum VII strongly raised posteriorly for reception of hypopygium. Connexivum wide and flat, exterior borders of connexiva slightly convex; PE-II to PE-V angularly protruding, with tips of angles directed backward; PE-VI rounded, and PE-VII angularly protruding backward as far as hypopygium, their tips rounded. Paratergites robust and short, reaching apical 1/3 of hypopygium; the latter cordate and strongly declivous, disc with a short, horizontal, median ridge at base. Tubercles on sternum VII minute, brown.

Color: Yellow brown with ochraceous incrustation.

Total length 4.72 mm; width of pronotum 1.48 mm; width of abdomen 2.64 mm.

Holotype ♂ (BISHOP 7855), Samoa, Upolu I., Mololelei Rd, 600 m, 18.VI.1940, E. C. Zimmerman coll. Label of Usinger "Carventus brachypterus."

Paratype 1♂, collected with holotype (Kormilev coll'n).

It is a pleasure to dedicate this odd species to its collector Dr E. C. Zimmerman, of the Bishop Museum, Honolulu, Hawaii.

These specimens were mentioned by Usinger & Matsuda (1959 : 120), but Usinger never published a description, and as the name *Carventus brachypterus* is preoccupied by *Carventus brachypterus* Kormilev, 1966, from Tasmania, this species should get a new name.

Carventinae is probably the most advanced of all subfamilies of Aradidae, and most

2. Measurements in ratios are that of length to width. (25 units=1 mm).

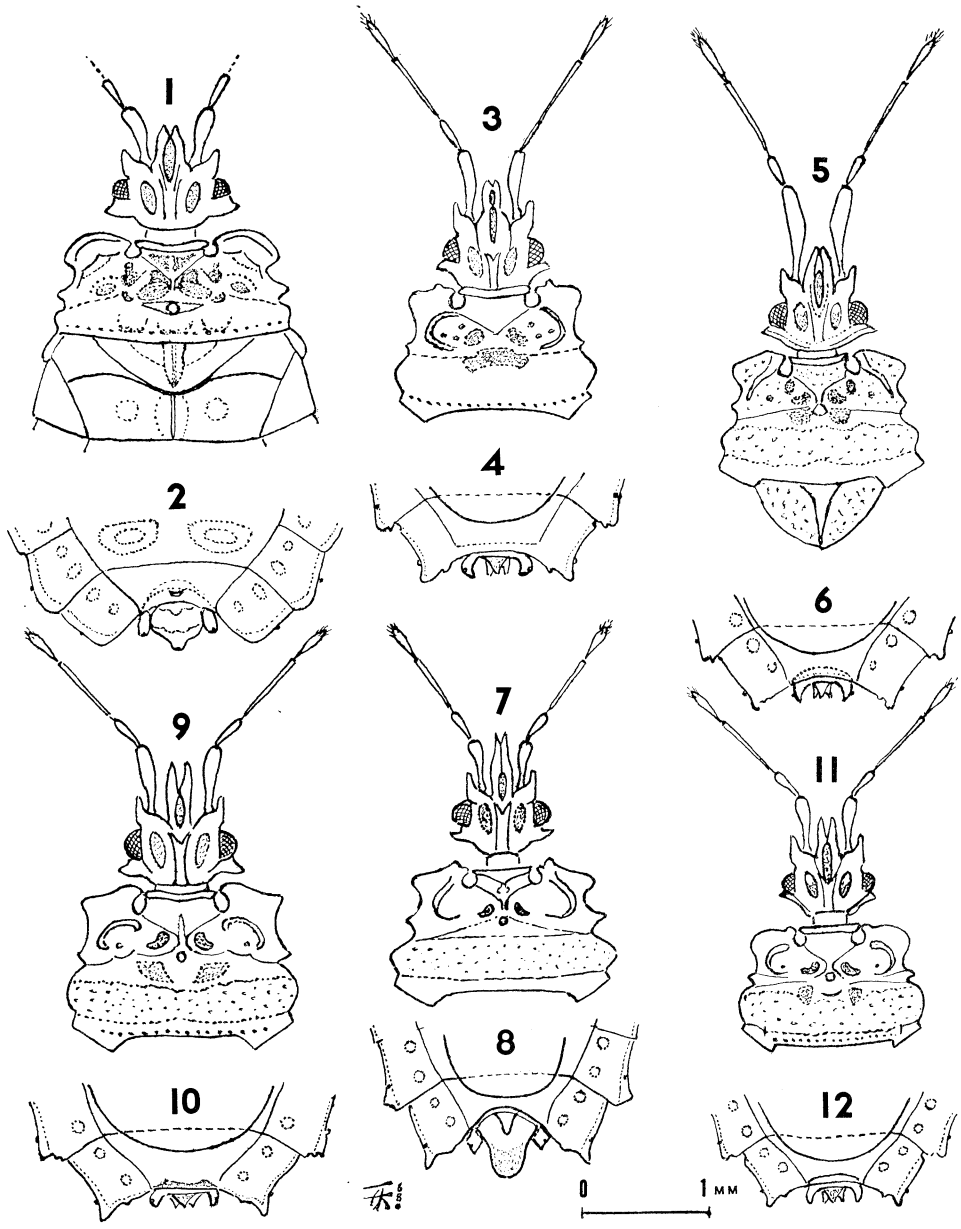


Fig. 1–12. 1, *Carventus zimmermani*, n. sp., (♂), head, pronotum, scutellum, and 1st 2 tergites; 2, same, tip of abdomen from above; 3, *C. denticollis* Stål (♀), type, head and pronotum; 4, same, tip of abdomen from above; 5, *C. vietnamensis*, n. sp., (♀), head, pronotum and scutellum; 6, same, tip of abdomen from above; 7, *C. longiceps*, n. sp., (♂), head and pronotum; 8, same, tip of abdomen from above; 9, *C. papuasicus*, n. sp., (♀), head and pronotum; 10, same, tip of abdomen from above; 11, *C. gracilis*, n. sp., (♀), head and pronotum; 12, same, tip of abdomen from above.

of its genera are apterous. Few genera which are still macropterous, sometimes, show inclination to brachypterism, i. e. *Carventus* Stål, 1865, and *Zimmermania* Usinger, 1948, which have some micropterous species.

Carventus denticollis Stål

Carventus denticollis Stål, 1873, *Enum. Hem.* **3**: 140.
Carventus elegantulus Kormilev, 1967, *Eos* **42**: 478, f. 10–11, **New Synonymy.**

♀ (Type). Elongate ovate, covered with whitish incrustation.

Head as long as its width across eyes (21 : 21); anterior process reaching 2/5 of antennal segment I, postocular tubercles produced beyond outer border of eyes, vertex raised medially. Relative length of antennal segments I to IV are : 12 : 7.5 : 15 : 10 (fig. 3). *Pronotum* shorter than its maximum width (26 : 39), fore lobe narrower than hind lobe (32.5 : 39); anterolateral angles produced forward slightly beyond collar, and laterally as rounded lobes; fore disc with 2 (1+1) crescent-shaped ridges laterally; lateral tooth small; hind disc granulate, and with a row of punctures along hind border. *Scutellum* subtriangular, shorter than its basal width (17 : 23); apical angle rounded, disc with median carina. *Hemelytra* reaching to middle of tergum VII. *Abdomen* longer than its maximum width (62 : 55); connexivum wide, PE-angles angularly protruding, PE-VI rounded, PE-VII produced backward beyond segment IX as divergent, rounded lobes; paratergites long and curved, reaching as far as segment IX, the latter tricuspidate. Spiracles II ventral, III to VI dorsal, VII lateral, VIII dorsolateral (fig. 4).

Color: Yellow brown, incrustation.

Total length 5.0 mm; width of pronotum 1.56 mm; width of abdomen 2.20 mm.

♀, Mysol I., (Naturhistoriska Riksmuseum, Stockholm).

Carventus vietnamensis Kormilev, new species Fig. 5–6.

♀. Elongate ovate, attenuated anteriorly, covered with brownish incrustation.

Head slightly longer than width across eyes (21 : 20); anterior process with genae convergent anteriorly, reaching 3/5 of antennal segment I. Antenniferous tubercles thin, dentiform, parallel. Eyes large, semiglobose. Postocular tubercles dentiform, produced beyond outer border of eyes; vertex slightly raised medially. Antennae thin and long, relative length of antennal segments I to IV are : 13 : 7.5 : 15.5 : 11. Labium reaching hind border of labial groove. *Pronotum* shorter than its maximum width (26 : 40), fore lobe narrower than hind lobe (33 : 40). Anterolateral angles forming expanded lobes obliquely subtruncate anteriorly and roundly produced laterally, separated from collar by deep incisures. Collar separated from disc by 2 (1+1) fine, oblique sulci connected with a short median furrow. Lateral tooth strong; round tubercle placed in middle of interlobal depression; fore and hind discs granulate. *Scutellum* subtriangular, shorter than width at base (13 : 25), with convex lateral borders and angularly rounded tip; disc rugose, with a thin, T-shaped median carina. *Hemelytra* reaching 2/3 of tergum VII; basolateral border of corium straight and reflexed. *Abdomen* longer than its maximum width across segment V (67.5 : 57.5); connexivum wide and horizontal; exterior borders of connexiva straight and finely crenulate, slightly sinuate only on connexivum VII; PE-angles II to VI angularly protruding, PE-VII produced backward beyond tips of paratergites as an acute angle; the latter slightly produced beyond small, tricuspidate segment IX. Spiracles II ventral; III to V dorsal, placed at a distance from border; VI to VIII lateral. *Legs* unarmed.

Color: Reddish brown, covered with brownish incrustation.

Total length 5.20 mm; width of pronotum 1.32 mm; width of abdomen 2.30 mm.

Holotype ♀ (BISHOP 7856), Viet Nam, 6 km S of Dalat, 1400–1500 m, 9.VI–7.VII.1961, N. R. Spencer.

Carventus vietnamensis n. sp. may be easily separated from other species by position of spiracles, III to V being dorsal.

Carventus philippinensis Kormilev, new species

♀. Closely related to *Carventus vietnamensis* n. sp. and similar in appearance, but slightly smaller; antennae relatively shorter, only 2× as long as head's width across eyes; antennal segment I as long as III, and anterolateral angles of pronotum more rounded anteriorly. Other characters, color, and position of spiracles similar to *C. vietnamensis* n. sp.

Measurements: head 21 : 19; relative length of antennal segments I to IV are : 12.5 : 7 : 12.5 : 9; pronotum 26 : 39, fore lobe narrower than hind lobe 32 : 39; scutellum 13 : 24; abdomen 64 : 56.

Total length 5.0 mm; width of pronotum 1.48 mm; width of abdomen 2.24 mm.

Holotype ♀ (BISHOP 7857), Philippines, Mindanao, Zamboanga del Sur, Lemesahan, 7. IX.1958, light trap, H. E. Milliron.

Carventus longiceps Kormilev, new species Fig. 7–8.

♂. Related to *Carventus horvathi* Kormilev, 1954, from New Guinea, but larger; head relatively longer, anterior process slightly produced beyond tip of antennal segment I; antenniferous tubercles also relatively longer, reaching almost to middle of antennal segment I; anterolateral angles of pronotum more receding laterally; paratergites larger and spear-shaped, reaching to middle of hypopygium; PE-VII pointed, reaching 4/5 of hypopygium. Tubercles on sternum VII of ♂♂ minute, brown. Other characters as in *C. horvathi* Kormilev. *Measurements*: head 24 : 21.5; relative length of antennal segments I to IV are : 10.5 : 7 : 12 : 9.5; pronotum 26 : 43, fore lobe narrower than hind lobe 37 : 43; scutellum 13 : 24; abdomen 70 : 57; hypopygium 12.5 : 12.5.

Spiracles II ventral, III to VIII lateral; color brown, incrustation ochraceous.

Total length 5.20 mm; width of pronotum 1.72 mm; width of abdomen 2.28 mm.

Holotype ♂ (BISHOP 7858), NE New Guinea, Busu Riv., E of Lae, 100 m, 14.IX.1955, light trap, J. L. Gressitt.

Carventus papuasicus Kormilev, new species Fig. 9–10.

♀. Somewhat related to preceding species, but antennae relatively longer, 2× as long as head's width across eyes (1.8× in *C. longiceps* n. sp.); anterior process of head shorter, reaching only 5/6 of antennal segment I; anterolateral lobes of pronotum differently shaped, their anterior border convex interiorly, then almost straight and receding; lateral border of fore lobe relatively longer and shallower, not so deep as in *C. longiceps* n. sp.; notch laterad of collar is deeper; scutellum relatively longer; exoconnexivum is a little more developed than in *C. longiceps*, though less than in *C. horvathi*; PE-angles II to V angular, PE-VI forming an acute angle, PE-VII pointed, divergent, produced slightly beyond tip of segment IX. Paratergites slightly shorter than tricuspidate segment IX. Spiracles II ventral, III to VIII lateral. Other characters and color as in *C. longiceps* n. sp. *Measurements*: head 25 : 22.5; relative length of antennal segments I to IV are : 13 : 8 : 15 : 9; pronotum 28.5 : 45, fore lobe narrower than hind lobe 37 : 45; scutellum 15.5 : 26; abdomen 74 : 69.

Total length 5.84 mm; width of pronotum 1.80 mm; width of abdomen 2.72 mm.

Holotype ♀ (BISHOP 7859), New Guinea, Papua, Normanby I., Wakaiuna, Sewa Bay, 21-30.XI.1956, W. W. Brandt.

Carventus gracilis Kormilev, new species Fig. 11-12.

♀. Closely related to *Carventus horvathi* Kormilev, 1954, but smaller and of finer build; PE-VII slightly shorter than paratergites and segment IX (they are distinctly longer in *C. horvathi*). Color lighter, yellow brown, covered with pale ochraceous incrustation. Other characters similar to *C. horvathi* Kormilev. *Measurements*: head 20 : 19; relative length of antennal segments I to IV are : 12 : 7 : 14 : 10; pronotum 23 : 37, fore lobe narrower than hind lobe 32 : 37; scutellum 13 : 23; abdomen 62 : 54.

Anterior process reaching 2/3 of antennal segment I; postocular tubercles produced beyond outer border of eyes; PE-angles II to VI slightly angularly protruding, PE-VII produced as pointed lobes, not reaching a little tips of paratergites and segment IX. Spiracles II ventral, III to VIII lateral.

Total length 4.84 mm; width of pronotum 1.48 mm; width of abdomen 2.16 mm.

Holotype ♀ (BISHOP 7860), NE New Guinea, Lae, IX.1949, N. L. H. Krauss.

Carventus depressus Kormilev, new species

♂. Elongate ovate, attenuated anteriorly, flat, covered with whitish incrustation.

Head flat, longer than width across eyes (20 : 18.5); anterior process reaching 3/5 of antennal segment I; postocular tubercles dentiform, robust, produced beyond outer border of eyes; postocular borders carinate and sinuate; vertex longitudinally raised. Antennae strong; relative length of antennal segments I to IV are : 10.5 : 6.5 : 12 : 8.5. Labium reaching hind border of a narrow labial groove. *Pronotum* flat, shorter than its maximum width (21 : 35), fore lobe narrower than hind lobe (31 : 35). Collar robust; anterior angles rounded and protruding; anterolateral angles convex anteriorly and produced sideways as rounded lobes; interlobal tooth moderately strong, produced slightly beyond anterolateral angles; humeri convex, then parallel. Fore and hind disc with all ridges more or less flattened. *Scutellum* shorter than its width at base (13 : 21), lateral borders convex, tip forming a slightly obtuse angle; disc with triangular basal elevation, somewhat flattened. *Hemelytra* reaching middle of tergum VII; basolateral border of corium carinate, slightly convex; corium reaching middle of scutellum. *Abdomen* longer than maximum width across segment V (57 : 50). PE-angles II to V protruding, blunt; PE-VI forming a right angle with blunt tip; PE-VII forming acute lobes produced backward as far as hypopygium; exterior border of connexivum VII deeply sinuate. Paratergites large, spear-shaped, reaching 3/4 of hypopygium; the latter acorn-shaped, strongly declivous. Spiracles II ventral; III to VII lateral, VIII dorsolateral. Tubercles on sternum VII in ♂ wide, convex, somewhat flattened.

Color uniformly testaceous.

Total length 4.48 mm; width of pronotum 1.40 mm; width of abdomen 2.00 mm.

Holotype ♂ (BISHOP 7861), Admiralty Is., Los Negros, II.1945, G. E. Bohart.

Carventus depressus n. sp. is related to *C. vietnamensis* n. sp., but is much smaller, with all ridges more or less flattened, and spiracles III to V lateral, not dorsal.

Carventus oviventris Kormilev, 1967, *Ent. Medd.* **35**: 294, f. 3-4.

NW NEW GUINEA: 1♀, Bodem. 11 km SE of Oerberfaren, 100 m, 7-17.VII.1959, T. C. Maa.

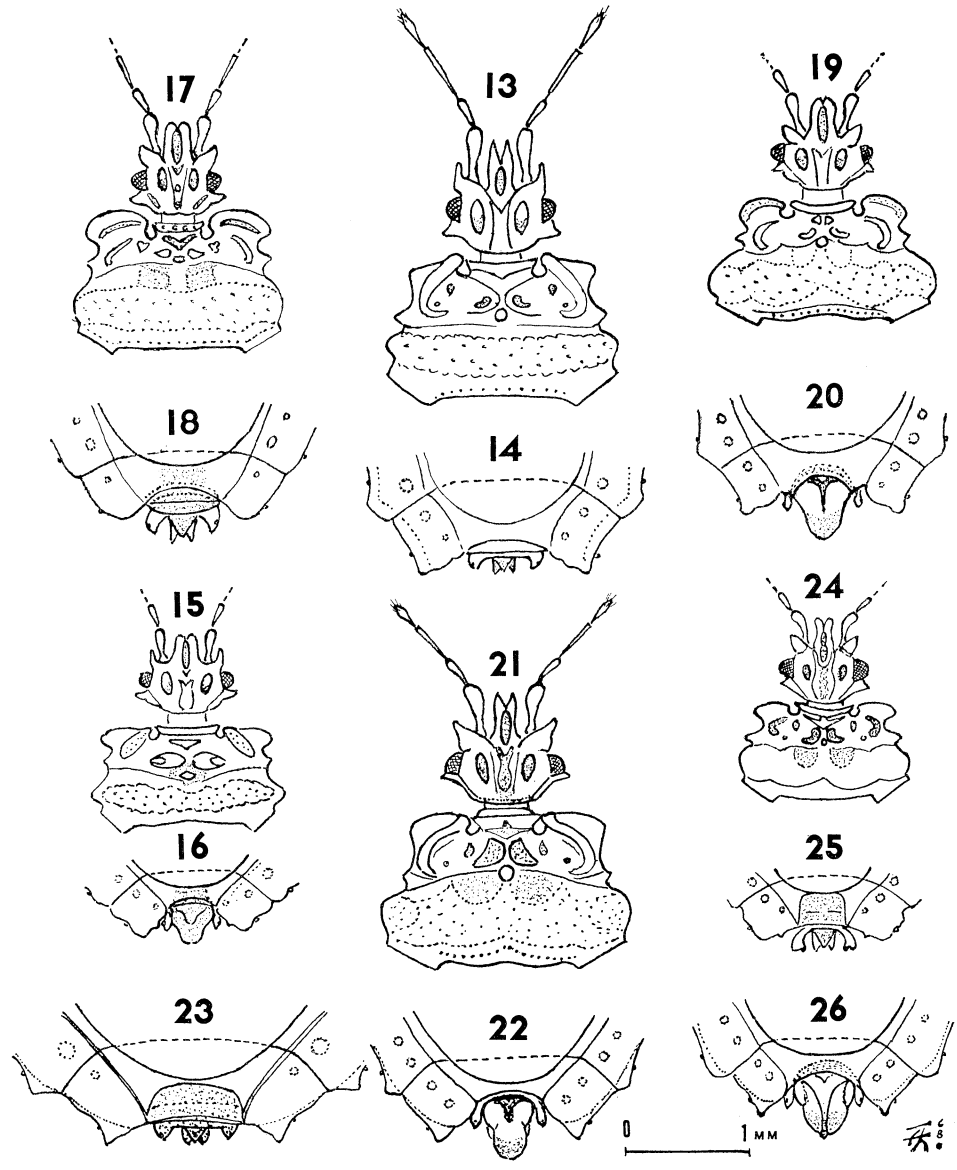


Fig. 13-26. 13, *Carventus gressitti*, n. sp., (♀), head and pronotum; 14, same, tip of abdomen from above; 15, *C. minusculus*, n. sp., (♂), head and pronotum; 16, same, tip of abdomen from above; 17, *C. sinensis*, n. sp., (♀), head and pronotum; 18, same, tip of abdomen from above; 19, *C. taiwanicus*, n. sp., (♂), head and pronotum; 20, same, tip of abdomen from above; 21, *C. stolidus* n. sp., (♂), head and pronotum; 22, same, tip of abdomen from above; 23, same, (♀), tip of abdomen from above; 24, *C. variegatus*, n. sp., (♀), head and pronotum; 25, same, tip of abdomen from above; 26, *C. crassus*, n. s. (♂), tip of abdomen from above.

Carventus horvathi Kormilev, 1954, *Phil. J. Sci.* **83**: 123, f. 1.

NEW GUINEA: 1♂, Papua, Kokoda, 400 m, 22.III.1956, J. L Gressitt; 2♀♀, Papua, Koparra-Sengi near Kokoda, 600 m, 28.III.1956, Gressitt; 1♀, (NE), Torricelli Mts, Sugoitei Vill., 900 m, 24.I-5.II.1959, W. W. Brandt; 1♀, (NE), Kassam, 1350 m, 48 km E of Kainantu, 7.XI.1959, T. C. Maa; 1♂ & 1♀, (NW), Bodem, 100 m, 11 km SE of Oeberfaren, 7-17.VII.1959, Maa.

Carventus gressitti Kormilev, new species Fig. 13-14.

♀. Related to *Carventus horvathi* Kormilev, 1954, but the head is as long as width across eyes; anterolateral angles of pronotum more oblique anteriorly, produced laterally less than lateral tooth; PE-angles II to V barely protruding, and without exoconnexivum; PE-VI forming an obtuse angle without small granule on posterolateral border; PE-VII less pointed and less produced backward, barely passing beyond segment IX; paratergites slightly shorter than tricuspidate segment IX. Other characters as in *C. horvathi* Kormilev. *Measurements*: head 22 : 22; relative length of antennal segments I to IV are : 11.5 : 7 : 12.5 : 10; pronotum 27.5 : 46, fore lobe narrower than hind lobe 37.5 : 46; scutellum 15 : 28; abdomen 75 : 65 (across segment IV). Anterior process reaching 2/3 of antennal segment I; postocular tubercles produced beyond outer border of eyes; spiracles II ventral, III to VIII lateral.

Color: Red brown; incrustation ochraceous; tergum yellow with 2 rows of sepia brown rings.

Total length 5.64 mm; width of pronotum 1.84 mm; width of abdomen 2.60 mm.

Holotype ♀ (BISHOP 7862), NE New Guinea, Sepik-Waghi Div., N of Banz, 1900 m, 11.VII.1955, J. L. Gressitt.

It is a pleasure to dedicate this species to Dr J. Linsley Gressitt, Chairman of Entomology at the Bishop Museum, who collected this species, and so many other new species of Aradidae.

Carventus minusculus Kormilev, new species Fig. 15-16.

♂. Related to *Carventus robustus* Kormilev, 1966, from Fiji, but smaller; genae not contiguous anteriorly, leaving tip of clypeus free; anterior process reaching middle of antennal segment I, postocular tubercles produced beyond outer border of eyes. Anterolateral angles of pronotum straight anteriorly and roundly produced laterally; lateral tooth produced as far as anterolateral angles. Just behind collar with a short, transverse ridge; another smaller ridge placed in interlobal depression medially; humeri produced sideways and rounded. Scutellum semicircular; disc rugose and with a T-form median ridge. Basolateral borders of hemelytra convex at base, then straight. Abdomen ovate; connexivum broad and horizontal, exterior borders of connexiva slightly uneven; PE-angles II to VI barely protruding, PE-VII with rounded tips, reaching middle of hypopygium. Paratergites small, clavate, reaching middle of hypopygium; the latter acorn-shaped, with median ridge extending to middle of disc. Spiracles II ventral, placed far from border; III to VII lateral; VIII dorsolateral. Tubercles on sternum VII small, high, with broad, truncate top. *Measurements*: head 15 : 20; relative length of antennal segments I to II (III and IV missing) are : 7 : 4.5 : — : —. Pronotum 21 : 37.5, fore lobe narrower than hind lobe 33 : 37.5; scutellum 11 : 17.5; abdomen 50 : 40 (across segments IV or V); hypopygium 8 : 8.

Color: Red brown, partially infuscate; anterolateral angles of connexiva IV to VII infuscate; tergum VII in middle and hypopygium fuscous; incrustation red brown.

Total length 3.72 mm; width of pronotum 1.50 mm; width of abdomen 1.92 mm.

Holotype ♂ (BISHOP 7863), Fiji, Moala I., 7.XII.1924, Bryan.

Carventus robustus Kormilev, 1966, *Rec. S. Austral. Mus.* **15**: 298, f. 25.

FIJI: 1♀, Lau, 12.VIII.1924, E. H. Bryan; 1♂, Viti Levu, Tholo-i-Suva, 27.VII.1938, beating, E. C. Zimmermann, 1♀, Viti Levu, Lami, IV.1951, N. L. H. Krauss.

Carventus sinensis Kormilev, new species Fig. 17-18.

♀. Elongate ovate, partially covered with whitish incrustation.

Head almost as long as width across eyes (19 : 21). Anterior process robust, with parallel sides, rounded anteriorly and slightly incised in middle, reaching 3/5 of antennal segment I. Antenniferous tubercles small, dentiform, convex exteriorly and divergent. Postocular tubercles distinctly produced beyond outer border of eyes; vertex with 2 tubercles medially, flanked by 2 (1+1) thin, divergent carinae. Antennae moderately stout; relative length of antennal segments I to III (IV are missing) are: 8.5 : 5.5 : 7.5 : —. Labium reaching hind border of labial groove. *Pronotum* shorter than its maximum width (27 : 44), fore lobe narrower than hind lobe (36 : 44). Collar distinctly separated from disc, granulate. Anterolateral angles strongly convex anteriorly and roundly produced laterally; lateral borders of fore lobe deeply sinuate; lateral tooth small; humeri convex, rounded. Fore disc with a short V-form carina just behind collar and small tubercle in middle of interlobal depression. Curved ridges placed on anterolateral lobes, and another 2 (1+1) mesad of lateral teeth. Hind lobe glabrous anteriorly in middle, and with somewhat blurred, fine granulation laterally; along hind border with a row of punctures. *Scutellum* subtriangular, shorter than its basal width (16 : 25). Basal border straight and raised, lateral borders slightly convex, tip angularly rounded; disc densely rugose, but without median ridge. *Hemelytra* broken off. *Abdomen* ovate, longer than its maximum width across segment IV (68 : 59). Terga I and II flat, completely fused together and separated from central dorsal plate by a very fine, slightly curved sulcus; their discs finely punctured. Central dorsal plate is flat, slightly uneven, very finely punctured, with exception of a wide glabrous band along lateral borders and round callous spots, 2 (1+1) on each segment. Tergum VII concave, raised and carinate along posterior border and laterally. Connexivum wide, granulate; exterior borders of connexiva slightly convex, PE-angles barely protruding; PE-VII rounded, reaching hind border of tergum VIII. Paratergites dentiform, reaching middle of posteriorly incised segment IX. Spiracles II sublateral, but not visible from above; III to VIII lateral.

Color: Red brown; head, middle of hind disc of pronotum, scutellum, terga VII and VIII, and all of segment IX, dark brown.

Total length 5.32 mm; width of pronotum 1.76 mm; width of abdomen 2.36 mm.

Holotype ♀ (BISHOP 7864), South China, Kwangtung, Cheung-nga San, Tintong, Loh-Chang Distr., 9.IX.1947, Tsang coll.

This is the first record of *Carventus* from China.

Carventus biroi Kormilev, 1954, *Phil. J. Sci.* **83**: 125, f. 2.

NEW GUINEA: 1♂, NE, Wau, Morobe Distr., 1200 m, 15-22.XI.1961, J. Sedlacek; 1♀, NE, Bulolo, 730 m, 23.VIII.1956, E. J. Ford, Jr.; 1♀, Papua, W. Distr., Oriomo Govt. Sta., 26-28.X.1960, J. L. Gressitt; 1♂, Papua, Brown R., 24.V.1954, E. J. Ford, Jr.; 1♀, NW, Hollandia area, W. Sentani, Cyclops Mts, 150-250 m, 17.VI.1959, J. L. Gressitt.

Carventus ovatus Kormilev, 1966, *Rec. S. Austral. Mus.* **15**: 296, f. 24.

FIJI: 1♂, Viti Levu, Tholo-i-Suva, 150 m, 25.VII.1939, E. C. Zimmerman.

Carventus taiwanensis Kormilev, new species Fig. 19–20.

♂. Elongate ovate, covered with whitish incrustation.

Similar to *Carventus sinensis* n. sp., but more attenuated anteriorly, and more widening posteriorly. Head and pronotum similar, only postocular tubercles smaller and more directed backward, vertex raised medially and without 2 tubercles, anterior process slightly constricted laterally. Fore lobe of pronotum with slightly different pattern of ridges, those on anterolateral lobes extending along borders; just behind collar are placed 2 (1+1) small tubercles, not V-shaped carina. Scutellum with T-shaped median ridge. Basolateral border of hemelytron straight (convex in *C. sinensis*). Central dorsal plate of abdomen finely punctured and with 2 (1+1) rows of round callous spots. Connexivum moderately wide; PE-angles II to VI progressively protruding and rounded, PE-VII angularly rounded and produced backward as far as paratergites; exterior borders of connexiva VI and VII slightly sinuate; paratergites small, clavate, reaching middle of a large, acorn-shaped hypopygium. Spiracles II ventral, III to VII lateral, VIII terminal. Tubercles on sternum VII large, semiglobose.

Anterior process reaching 3/4 of antennal segment I; anterolateral angles of pronotum convex anteriorly and roundly protruding laterally. Hypopygium with a Y-shaped median ridge reaching middle of upper surface. *Measurements*: head 18 : 20; relative length of antennal segments I to II (III and IV are missing) are : 9 : 6 : - : - ; pronotum 25 : 42.5, fore lobe narrower than hind lobe 32.5 : 42.5; scutellum 14 : 25, abdomen 69 : 58; hypopygium 15 : 13.

Color: Reddish brown; incrustation whitish.

Total length 5.10 mm; width of pronotum 1.70 mm; width of abdomen 2.32 mm.

Holotype ♂ (BISHOP 7865), Taiwan (Republic of China), Urai-Rimogan, 21.VI.1941, A. Kira.

Carventus stolidus Kormilev, new species Fig. 21–23.

♂. Related to *Carventus taiwanensis* n. sp., but is larger; anterior process of head distinctly cleft, reaching 4/5 of antennal segment I; postocular tubercles very small, slightly protruding beyond outer border of eyes; behind collar with a transverse ridge, not 2 (1+1) tubercles, and median sulcus behind ridge more pronounced. PE-angles II to V slightly protruding, PE-VI more acutely protruding; PE-VII acute, distinctly produced beyond tips of paratergites (♂), or slightly produced (♀). Paratergites (♂) small, clavate, reaching middle of hypopygium; the latter acorn-shaped, with a short, triangular ridge medially at base. Paratergites (♀) triangular, reaching 2/3 of tricuspidate segment IX. Anterolateral lobes of pronotum less convex anteriorly, and less produced laterally. Spiracles II ventral, III to VII lateral, VIII terminal (♂), or lateral (♀). *Measurements*: head ♂-23 : 25, ♀-25 : 27.5; relative length of antennal segments I to IV are : ♂-11 : 7 : 9 : 9, ♀-12.5 : 9 : 11 : 10; pronotum ♂-30 : 50, ♀-35 : 57.5, fore lobe narrower than hind lobe ♂-40 : 50, ♀-47.5 : 57.5; scutellum ♂-15 : 28, ♀-16 : 31; abdomen ♂-71 : 63, ♀-90 : 82.5; hypopygium 12.5 : 12.5. Tubercles on sternum VII (♂) large, conical, with flattened top.

Color: Reddish brown, yellow brown on connexivum; incrustation ochraceous.

Total length ♂-5.64 mm, ♀-6.88 mm; width of pronotum ♂-2.00, ♀-2.30 mm; width of abdomen ♂-2.52, ♀-3.30 mm.

Holotype ♂ (BISHOP 7866), New Guinea, Papua, Bisianumu E of Port Moresby, 500 m, (Primary Forest), 8.VI.1955, J. L. Gressitt. Allotype ♀, NE New Guinea, Busu Riv., E of Lae, 100 m, 13.IX.1955, J. L. Gressitt (BISHOP).

Carventus crassus Kormilev, new species Fig. 26–27.

♂. Closely related to *Carventus biroi* Kormilev, 1954, also from New Guinea, but slightly larger; hypopygium with a median ridge extending to, or slightly over, tip of lower, globose portion (only to middle in *C. biroi*) in the ♀, segment IX is rounded posteriorly (tricuspidate in *C. biroi*). Tubercles on sternum VII (♂) are larger, with flat upper surface being distinctly wider than narrow stem (in *C. biroi* they are smaller, conical, with a narrow, flat, upper surface). Other characters similar in both species.

Anterior process strongly dilated and bifurcate anteriorly, reaching 3/4 of antennal segment I; postocular tubercles produced beyond outer border of eyes; anterolateral angles of pronotum receding laterally and rounded; interlobal tooth small, produced slightly beyond anterolateral angles, but less than humeri. A large, round tubercle is placed in the middle of interlobal depression; fore disc with 2 (1+1) oblique ridges laterally, and thin, short, median sulcus; hind disc with 2 (1+1) large, rounded, glabrous spots anteriorly. PE-angles II to V slightly, subangularly protruding; PE-VI more protruding and rounded; PE-VII forming a slightly acute angle with blunt tips, reaching beyond paratergites (♂); paratergites small, clavate, reaching middle of hypopygium; in ♀, paratergites small, converging, reaching middle of rounded posteriorly segment IX. Spiracles II ventral, III to VIII lateral. *Measurements*: head ♂-20 : 22.5, ♀-20 : 23; relative length of antennal segments I to IV are : ♂-9 : 6 : 9 : 8.5, ♀-9 : 6 : 8.5 : 7.5; pronotum ♂-25.5 : 43, ♀-26 : 44; fore lobe narrower than hind lobe ♂-34.5 : 43, ♀-35 : 44; scutellum ♂-12.5 : 25, ♀-12.5 : 26; abdomen ♂-66 : 56, ♀-70 : 62.5; hypopygium 11 : 12.

Color: Brown, incrustation brownish.

Total length ♂-5.08, ♀-5.20 mm; width of pronotum ♂-1.72, ♀-1.76 mm; width of abdomen ♂-2.25, ♀-2.50 mm.

Holotype ♂ (BISHOP 7867), NW New Guinea, Bodem, 100 m, 11 km SE of Oeberfaren, 7–17.VII.1959, T. C. Maa. Allotype ♀, NW New Guinea, Vogelkop, Kebar Val. W of Manokwari, 550 m, 4–31.I.1962, L. W. Quate (BISHOP). Paratypes: 2♂♂ collected with holotype; SW New Guinea, 1♀ Vogelkop, Fak Fak, S coast of Bomberai, 100–700 m, 5. VI.1959, T. C. Maa (BISHOP & Kormilev coll'n).

Carventus variegatus Kormilev, new species Fig. 24–25.

♀. Related to *Carventus minutus* Kormilev, 1955, but larger; lateral crescent-shaped ridges on the fore lobe of pronotum not developed, marked only by a row of small granules. Exterior borders of connexiva irregularly granulate; PE-angles II to VI more protruding, angular; PE-VII forming a right angle with rounded tip. Paratergites longer, bicuspidate, reaching tip of segment IX; latter tricuspidate. Spiracles II sublateral, placed almost on border; III to VII lateral, VIII terminal.

Anterior process reaching 3/4 of antennal segment I. Postocular tubercles produced slightly beyond outer border of eyes; vertex raised medially. Middle of interlobal depression with a small, round tubercle. *Measurements*: head 17 : 20; relative length of antennal segments I to II (III and IV are missing) are : 7.5 : 4 : - : -; pronotum 20 : 36, fore lobe narrower than hind lobe 30 : 36; scutellum 12.5 : 20; abdomen 56 : 47.

Color: Pale testaceous; 2 (1+1) callosities on hind lobe of pronotum, tergum VII posteriorly, and segment IX, are brown; transverse streak along hind border of pronotum, tip of scutellum, round spots on corium, and various irregular spots on membrane, black; incrustation white.

Total length 4.24 mm; width of pronotum 1.44 mm; width of abdomen 1.88 mm.

Holotype ♀ (BISHOP 7868), Bismarck Arch., New Britain, Gazelle Pen., Baining, St.

Paul's, 350 mm, 6.IX.1955, J. L. Gressitt.

Carventus australis Kormilev, 1958, *J. N. Y. Ent. Soc.* **66**: 87, fig. 1-2.

AUSTRALIA: 1♀, Queensland, Babinda, 1915, ex cane, A. T. Dood.

Carventus quatei Kormilev, new species Fig. 28-29.

♀. Related to *Carventus robustus* Kormilev, 1966, from Fiji, but smaller; antennal segment III shorter than IV (longer in *C. robustus*); pronotum with a tubercle behind collar (transverse ridge in *C. robustus*); basolateral borders of corium convex (straight in *C. robustus*).

Spiracles II ventral, III to VII lateral, VIII terminal. In my description of *Carventus robustus* (1966 : 300) it erroneously was printed that spiracles II are lateral, whereas they are ventral and not visible from above. Other characters are similar to *C. robustus* Kormilev. *Measurements*: head 17 : 21.5; relative length of antennal segments I to IV are: 7 : 5 : 6 : 7.5; pronotum 25 :

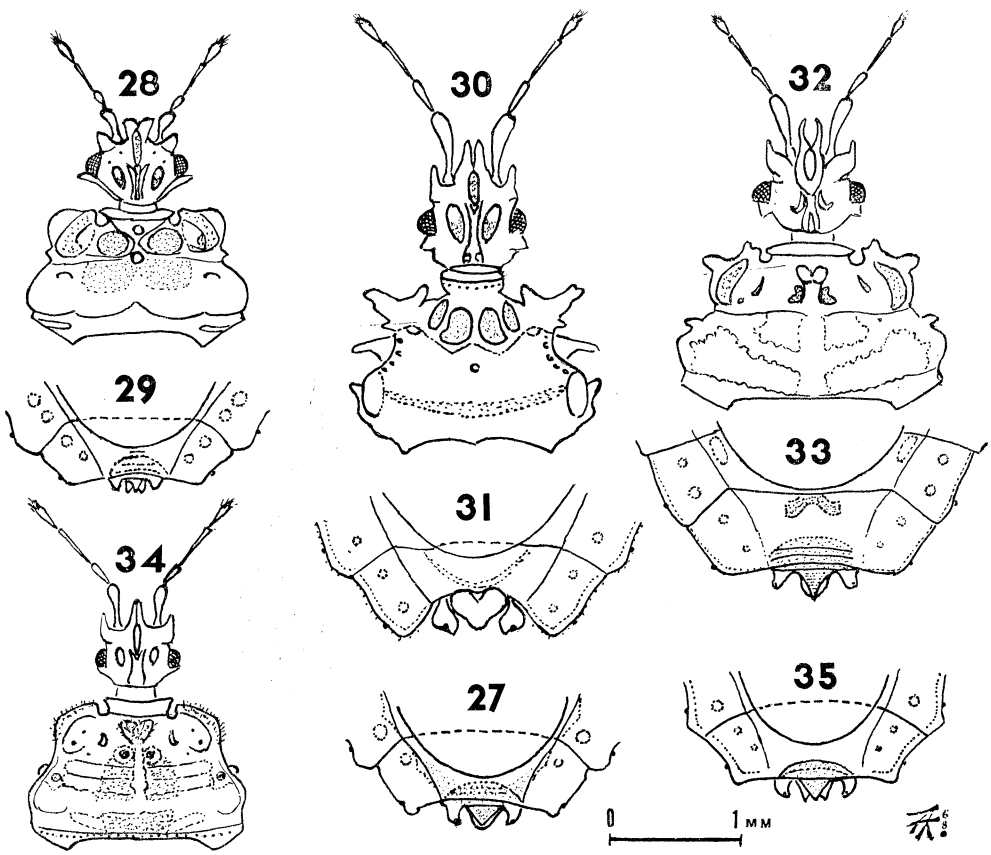


Fig. 27-35. 27, *Carventus crassus*, n. sp., (♀), tip of abdomen from above; 28, *C. quatei*, n. sp., (♀), head and pronotum; 29, same, tip of abdomen from above; 30, *Camerarius stali* (Bergroth), (♂), head and pronotum (type); 31, same, tip of abdomen from above; 32, *C. intermediarius*, n. sp., (♀), head and pronotum; 33, same, tip of abdomen from above; 34, *C. aberrans*, n. sp., (♀), head and pronotum; 35, same, tip of abdomen from above.

42.5, fore lobe narrower than hind lobe 32.5 : 42.5; scutellum 12.5 : 25; abdomen 60 : 56 across segment IV.

Color: Brownish; incrustation whitish.

Total length 4.60 mm; width of pronotum 1.70 mm; width of abdomen 2.24 mm.

Holotype ♀ (BISHOP 7869), Philippines, Mindanao, Bukidnon, 1250 m, Mt. Katanglad, 4-9.XI.1959, L. W. Quate.

It is a pleasure to dedicate this species to its collector, Dr L. W. Quate, who collected many new species of Aradidae.

Carventus minutus Kormilev, 1955, *Rev. Ecuatoriana Ent. Par.* **2**: 486, fig. 1-3.

NEW GUINEA: 1♀, Papua, Kokoda, Pitoki, 400 m, 23.III.1956, J. L. Gressitt. BISMARCK ARCH.: 1♂, New Britain, Keravat, 20-25.XI.1959, T. C. Maa; 1♀, New Britain, Gazelle Pen., Warongi Val., 100 m, 24.V.1956, Gressitt. SOLOMON IS., 1♀, Malaita, Tangtalau-Kwalo, 200-350 m, 24.VII.1957, J. L. Gressitt.

Genus **Camerarius** Distant, 1902

Oriental and South Pacific species of *Camerarius* Distant may be separated by the following key:

KEY TO SPECIES OF CAMERARIUS DISTANT

1. All 6 femora with subapical spines (Java) ..... **armatus** Kormilev, 1953
   All femora unarmed 2
2. Spiracles III and IV sublateral and not visible from above 3
   At most spiracles III sublateral and not visible from above 4
3. Postocular tubercles almost reaching outer border of eyes; PE-angles V to VII angularly rounded (Sumatra) ..... **milleri** Kormilev, 1967
   Postocular tubercles by far not reaching outer border of eyes; PE-angles acutely produced, though their tips are blunt (Borneo) ..... **borneensis** Kormilev, 1967
4. Spiracles III sublateral and not visible from above; anterolateral processes of pronotum absent and lateral tooth greatly reduced (New Guinea) ..... **aberrans***
   Spiracles III lateral and visible from above; anterolateral processes of pronotum present, lateral tooth more developed 5
5. Head as long, or almost as long as width across eyes (22.5 : 22) 6
   Head distinctly longer than width across eyes (21 : 18) 7
6. Antennal segment I as long as III (11 : 11) (Samoa, Fiji) ..... **kirkaldyi** China, 1930
   Antennal segment I distinctly longer than III (12.5 : 7) (Fiji) ..... **intermediarius***
7. Antennal segment I almost 1/2 as long as head's width across eyes (12 : 21)(New Guinea, Bismark, Solomon Is.) ..... **stali** Bergroth, 1889
   Antennal segment I only slightly shorter than head's width across eyes (22 : 23) 8
8. Connexivum VII forming longer and narrower lobes; ratio between length of exterior and posterior borders of connexivum VII as 20 : 17 (♂), or 17 : 15 (♀) (New Guinea) ..... **pallescens** (Walker), 1873
   Connexivum VII forming shorter and wider lobes; ratio between length of exterior and posterior borders as 15.5 : 15 (♂), or 17 : 17 (♀) (Bismarck Arch.) ..... **peterseni** Kormilev, 1967

Table 2. Distribution of Oriental and South Pacific species of *Camerarius* Distant.

No.	Name	Sumatra	Java	Borneo	Aru I.	New Guinea	Bismark Arch.	Solomon Is.	Fiji	Samoa
1	*milleri* (Kormilev), 1967	*	—	—	—	—	—	—	—	—
2	*armatus* Kormilev, 1953	—	*	—	—	—	—	—	—	—
3	*borneensis* (Kormilev), 1967	—	—	*	—	—	—	—	—	—
4	*pallescens* (Walker), 1873	—	—	—	*	*	—	—	—	—
5	*aberrans**	—	—	—	—	*	—	—	—	—
6	*stali* (Bergroth), 1889	—	—	—	—	*	*	*	—	—
7	*peterseni* (Kormilev), 1967	—	—	—	—	*	*	—	—	—
8	*intermediarius**	—	—	—	—	—	—	—	*	—
9	*kirkaldyi* (China), 1930	—	—	—	—	—	—	—	*	*

Camerarius pallescens (Walker), 1873 *Revalidated comb.*

Crimia pallescens Walker, 1873, *Cat. Hem. Het. Brit. Mus.* **7**: 20.
Camerarius pallescens: Distant, 1902, *Ann. Mag. Nat. Hist.* ser. 7, **9**: 358.
Carventus pallescens: Usinger & Matsuda, 1959, *Class. Aradidae*, p. 121.

The following measurements were kindly taken by Mrs G. M. Black on the type of Walker (♂), and supplied by kind office of Dr W. J. Knight of the British Museum (N. H.).

Head length 26, width 23; relative length of antennal segments I to II (III and IV are missing) are 22 : 12.5 : - : -; total length 5.88 mm, width of pronotum 2.04 mm, width of abdomen 2.71 mm.

NEW GUINEA: 1♂ & 1♀, (NW) Waris, S of Hollandia, 450-500 m, 16-31.VIII.1959, T. C. Maa; 1♂ (NE), Eliptamin Valley, 1200-1350 m, 1-15.VII.1959, W. W. Brandt.

Camerarius stali (Bergroth), 1889, new combination

Carventus stali Bergroth, 1889, *Ann. Soc. Ent. Belg.* **33**: 181.
Camerarius wappersi Kormilev, 1954, *Phil. J. Sci.* **83**: 128. **New synonymy.**

Type. ♂. Elongate ovate, incrustation white.

Anterior process of head cleft, reaching middle of antennal segment I; antenniferous tubercles slender, parallel, reaching 1/4 of antennal segment I; postocular tubercles dentiform, directed obliquely backward, reaching outer border of eyes. Vertex raised medially, with 2 (1+1) small granules posteriorly. Antennae slender, 2× as long as head's width across eyes (41.5 : 21). Collar protruding forward, a row of granules extends behind its hind border. Anterior angles of pronotum dentiform, convergent; anterolateral angles strong, obliquely produced sideways as long, tapering lobes; behind them are placed 2 (1+1) small teeth; lateral teeth strong; humeri with 2 (1+1) small teeth directed slightly forward. Scutellum subtriangular; lateral borders slightly convex and constricted in the middle, tip angular. Abdomen ovate, longer than its maximum width across segment V; exterior borders of connexiva finely serrate, PE-angles II to V slightly, angularly protruding; PE-VI angularly rounded; PE-VII produced backward

slightly beyond hypopygium, and angularly rounded. Paratergites large, flat, incised in middle of posterior border, reaching tip of hypopygium; the latter cordate. Spiracles II ventral, III to VII lateral, VIII dorsolateral. *Measurements*: Head 24 : 21; relative length of antennal segments I to IV are : 12 : 7.5 : 15 : 7; pronotum 31 : 48; scutellum 16 : 24; abdomen 80 : 66 (across segment V); hypopygium 7.5 : 10.

Color: Yellow brown, but mostly concealed by white incrustation.

Total length 6.20 mm; width of pronotum 1.92 mm; width of abdomen 2.64.

Type: ♂. New Guinea, D. Higgins coll. deposited at Institut Royal des Sciences Naturelles de Belgique, Brussel.

NEW GUINEA: (West) 1♀, Biak I., 50-100 m, Mangrowawa, 30.V.1959, T. C. Maa coll.; 1♀, Eramboe, 80 km ex Merauke, 29.I.1960, Maa; 1♀, Bodem, 100 m, 11 km SE of Oerberfaren, 17.VII.1959, Maa; (NE) Lae, sea level, 26.VII.1955, J. L. Gressitt; (Papua) W. District, Oriomo Govt Sta, 26-28.X.1960, Gressitt. BISMARK ARCH., 1♀, Rossum, 6 km SE of Lorengau, 23.XII.1959, Maa; 1♀, New Ireland, "Camp Bishop", 12 km up Kait R., 240 m, 14.VII.1956, E. J. Ford Jr. SOLOMON IS., 1♀, Guadalcanal, Beticama R., IX. 1960, W. W. Brandt; 1♀, New Georgia group, Gizo I., 11.VII.1959, Gressitt.

Camerarius peterseni (Kormilev), 1967, new combination

Carventus peterseni Kormilev, 1967, *Ent. Medd.* **35**: 295, f. 5-6.

BISMARK ARCH.: 1♀, New Britain, Gazelle Pen., Upper Warangoi, Illugi, 13.XII.1962, J. Sedlacek; 1♀, New Britain, Gazelle Pen., Mt Sinewit, 900 m, 5-14.XI.1962, Sedlacek; 1♀, New Britain, Gazelle Pen., Mt Sinewit, 1100-1200 m, 15-16.XI.1962, Sedlacek. NEW GUINEA: Papua, 1♂ & 1♀, Kiunga, Fly River, 8-10.VIII.1957, 1-7.X.1957, W. W. Brandt; 1♀, Bisianumu E of Port Moresby, 500 m, 24.IX.1955, J. L. Gressitt; 1♀, Daradae Pl'n, 500 m, 80 km N to Port Moresby, 4.IX.1959, T. C. Maa; 1♂, Daradae nr Javarere, Musgrove R., 100 m, 2.X.1958, J. L. Gressitt; (NE) 1♀, Maprik, 160 m, 14.X.1957, Gressitt; 1♀, Eliptamin Valley, 1200-1350 m, 1-15.VII.1959, W. W. Brandt; 1♀, Feramin, 120-150 m, 23-31.VI.1959, W. W. Brandt.

1♀ from Amboina, collected by F. Muir, probably belongs to this species also, but it was relatively wider, particularly the abdomen.

Camerarius kirkaldyi (China), 1930, new combination

Carventus kirkaldyi China, 1930, Ins. Samoa **2**: 109.

FIJI: 1♀, Viti Levu, Lami, V.1951, N. L. H. Krauss; 1♀, Fiji, Koebele.

Camerarius intermediarius Kormilev, new species Fig. 32-33.

♀. Related to *Camerarius kirkaldyi* (China), 1930, but smaller; anterior process reaching slightly over middle of antennal segment I; antenniferous tubercles shorter and divergent; eyes more rounded and more protruding; postocular tubercles minute, simple, not in a shape of a hook. Processes of fore lobe of pronotum reduced, and posterolateral absent; postcollar tubercle, and lateral ridges of fore lobe well developed. Fore lobe with a few small callous spots, and hind lobe with 2 (1+1) large ones. Scutellum triangular; disc raised and with median depression. Connexiva III to V, each with 1 large and 1 small, round, callous spot; on VI larger spot is much smaller than on preceding connexiva; on VII both spots are small. Tergal plate laterally with 6 (3+3) raised, elongate, internally convex, incrustated spots. Lateral borders of connexiva slightly convex; PE-II to VI rounded, PE-VII angularly rounded, neither produced

sideways, nor backward. Paratergites subcylindrical, reaching middle of segment IX; the latter rounded posteriorly. Spiracles II ventral, III to VII lateral, VIII terminal. Legs unarmed. Antennae, legs, protuberances on pronotum, disc of scutellum, and exterior borders of connexiva, covered with longer, or shorter, soft and fine, sometimes slightly curled hairs. *Measurements*: head 22.5 : 22; relative length of antennal segments I to IV are : 12.5 : 7 : 7 : 6; pronotum 30 : 50, fore lobe narrower than hind lobe 40 : 50; scutellum 15 : 30; abdomen 80 : 71.

Color: Brown; antennae and legs yellow brown; incrustation pale ochraceous.

Total length 6.00 mm; width of pronotum 2.00 mm; width of abdomen 2.84 mm.

Holotype ♀ (BISHOP 7870), Fiji, Viti Levu, Tholo-i-Suva, 500 m, 25.VII.1938, beating, E. C. Zimmerman.

Camerarius intermediarius n. sp. represents a transition between regular *Camerarius* and the next species *C. aberrans* n. sp. from New Guinea; the latter is so advanced, that without this link it would be difficult to place it in *Camerarius*.

Camerarius aberrans Kormilev, new species Fig. 34–35.

♀. Related to *Camerarius intermediarius* n. sp., but reduction of processes on fore lobe of pronotum has greatly advanced, practically leaving it without processes at all, anterolateral angles forming an obtuse angle. Lateral tooth of pronotum also greatly reduced. Postocular tubercles become adherent to eyes. At first sight, it differed so much from the regular *Camerarius*, that I thought of erecting a separate genus. However after a very close examination, its relationship to the preceding species became evident: head, pattern of pronotum, scutellum, abdomen, even soft, curled hairs on prominent portions of body, antennae and legs, are similar in both species.

Head as long as its width across eyes (17.5 : 17.5); anterior process reaching middle of antennal segment I, genae much longer than clypeus and contiguous in front of the latter. Antenniferous tubercles dentiform, parallel, reaching 1/3 of antennal segment I; postocular small, adherent to eyes, not reaching outer border of the latter. Vertex raised medially. Antennae slender, relative length of antennal segments I to IV are : 9.5 : 6 : 8.5 : 7. Labium reaching hind border of a deep and wide labial groove. *Pronotum* shorter than its maximum width (27.5 : 41), fore lobe narrower than hind lobe (32.5 : 41); collar distinctly separated from disc; anterior and anterolateral processes of fore lobe absent; lateral tooth reduced to a small tubercle. Fore lobe with a large tubercle behind collar, and 2 (1+1) lateral ridges covered with curled hairs; interlobal depression deep, in front and behind it a few transverse, fine sulci. Hind lobe sloping forward and backward; 2 (1+1) large callosities placed anteriorly in middle and 1 much larger posteriorly. *Scutellum* triangular, shorter than its basal width (15 : 21); disc inflated and incrusted. *Hemelytra* reaching middle of tergum VII, corium reaching middle of scutellum. *Abdomen* longer than maximum width across segment IV (67 : 55); connexivum wide, slightly reflexed; connexiva III to VII each with 2 round callous spots; PE-angles slightly protruding, rounded; exterior borders of connexiva II to IV barely convex, V straight, VI barely sinuate, VII sinuate posteriorly. Paratergites reaching 3/4 of a small, tricuspidate segment IX. Spiracles II ventral, placed close to border, III sublateral but not visible from above, IV to VIII lateral. *Legs* unarmed.

Color: Sepia; antennae and legs brown, incrustation ochraceous.

Total length 5.00 mm; width of pronotum 1.64 mm; width of abdomen 2.20 mm.

Holotype ♀ (BISHOP 7871), New Guinea (West), Waris, S of Hollandia, 450–500 m, 24–31.VIII.1959, T. C. Maa coll.