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Further notes on the millipede family Cryptodesmidae in Southeast Asia, with descriptions of a new genus and two new species from Indochina (Diplopoda: Polydesmida)

Sergei I. Golovatch

Abstract. A new genus and species, *Carinocryptus semenyukae*, new genus, new species, is described from southern Vietnam, differing from other genera of the family, including the apparently most similar genus *Circulocryptus* Golovatch, 2016, primarily by the peculiar mid-dorsal rib on postcollum metaterga, the presence of a cerotegument crust on the collum, following metaterga and epiproct, and of bipartite, stout, non-circular gonopodal telopodites, in which a separate, anterior, solenophorous branch shows, just opposite a retrorse spiniform solenomere on the main, basal branch, an underdeveloped accessory seminal chamber and a long seminal duct ending up apically. These two genera form the new tribe Circulocryptini, tribus nova, characterised by a biramous gonopodal telopodite, in which the seminal groove runs along the basal, posterior branch to end up on a distinct, retrorse, spiniform solenomere, whereas the anterior branch is a solenophore supplied with both an accessory seminal chamber or its anlage and an accessory seminal duct lying or starting opposite the solenomere tip. A new species of *Circulocryptus* is described from Cambodia: *C. kompantsevi*, new species, distinguished from both other known congeners by the conspicuously swollen anterior half of the collum and certain minor details of the gonopodal structure, i.e., the shapes of the prefemoral process and basal branch. All three presently known species of *Circulocryptus* are keyed. *Ophrydesmus anichkini* Golovatch, 2015 is put on record for a second time, again from southern Vietnam where the species shows peculiar, likely population-level variations in body colouration. Descriptive notes and the first meaningful illustrations are presented for *Ophrydesmus kedahensis* (Wang & Tang, 1965), a species known from continental Western Malaysia and Singapore. Based on the male holotype, the assignment of *O. kedahensis* to *Ophrydesmus* is confirmed, and a group of congeners it joins through sharing inflated male femora 3 and evident sternal cones outlined.

Key words. taxonomy, new tribe, genus, species

INTRODUCTION

The tropical to subtropical millipede family Cryptodesmidae has recently been reviewed in the scope of the Asian fauna and shown to comprise 35 species from 13 genera (Golovatch, 2015, 2016, 2018; Golovatch & VandenSpiegel, 2017). To continue my efforts in refining the systematics of this family in Southeast Asia, the present paper puts on record a new genus and species from Vietnam, a new species from Cambodia, provides a new record from Vietnam, and clarifies the identity of an old species from mainland Western Malaysia and Singapore.

MATERIAL AND METHODS

All fresh material, including the types of both new species described below, is in the collection of the Zoological Museum, State University of Moscow, Russia (ZMUM). The holotype of the old species treated below is housed in the Zoological Reference Collection (ZRC) of the former Raffles Museum of Biodiversity Research, Singapore (RMBR), now the Lee Kong Chian Natural History Museum (LKCNHM).

The sole picture to show live colouration was taken in the field by I.I. Semenyuk (Institute for Problems of Ecology and Evolution, Moscow and Joint Russian-Vietnamese Tropical Center, Ho Chi Minh City, Vietnam), while focus stacking photographs were executed in the lab by Kirill V. Makarov (Teachers' Training University of Moscow, Russia), using Zerene Stacker software.

In the catalogue sections, D stands for a description or the appearance in a key, R for new or old records, while M for a mere mention.

TAXONOMY

Circulocryptus kompantsevi, new species
(Figs. 1, 2)

Material examined. Holotype male (ZMUM), Cambodia, Kampot Prov., Elephant Mountains, Phnom Pokor National Park, inside a rotten fruit body of *Gonoderma* fungus,

Institute for Problems of Ecology and Evolution, Russian Academy of Sciences, Moscow 119071, Russia; Email: sgolovatch@yandex.ru

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10°37′08.89″N, 104°04′40.87″E, 8.XII.2017, leg. A. Kompantsev.

Diagnosis. Differs from both known congeners, *C. fallei* Golovatch, 2016, the type-species from southern and central-southern Vietnam (Golovatch, 2016; Golovatch & VandenSpiegel, 2017), and *C. javanicus* Golovatch, 2018, from western Java, Indonesia (Golovatch, 2018), by the conspicuously swollen anterior half of the collum and certain minor details of the gonopodal structure, i.e., the shapes of the prefemoral process and basal branch. In showing 25 radii at the anterior margin of the collum, only four transverse rows of tubercles and four lateral lobulations on each of postcollum metaterga, *C. kompantsevi*, new species, seems to be more similar to the geographically closer *C. fallei*, but differs clearly in the light body (vs. sometimes dark), the presence of a fimbriate prefemoral process **p** (vs. a finger-shaped trichostele) on the gonopodal telopodite, the latter's branch **b** being somewhat longer than branch **sph** (Fig. 2B, C).

Name. Honours Dr. Aleksandr Kompantsev, the collector.

Description. Length ca 16 mm, width of midbody pro- and metazonae 1.6 and 3.8 mm, respectively. General colouration in alcohol rather uniformly light pinkish (Fig. 1), only antennae brown to dark purplish brown, increasingly infuscate distad; head, anterior half of collum, distal halves of postcollum paraterga, mid-dorsal parts of prozonae, sterna and legs light yellowish to creamy.

Body with 20 segments. In width, head << collum < segment 2 < 3 < 4 = 15; thereafter body gradually tapering towards telson. Head densely setose, between and behind antennae densely and clearly microgranulate; epicranial suture superficial, more distinct in vertigial region. Antennae very short and densely setose, clearly clavate, C-shaped (Fig. 1A–C); in length, antennomere 1 = 2 = 4 = 7 < 3 < 6 < 5; antennomeres 5 and 6 subequally high, each with a small, compact, apicodorsal group of minute bacilliform sensilla. Interantennal isthmus ca 1.3 times as broad as diameter of antennal socket.

Tegument mostly dull and clearly microgranulate almost throughout, only prozonae and strictures between pro- and metazonae shining, very finely shagreened (prozonae) or micro-alveolate (strictures). Dorsum strongly and regularly convex; paraterga mostly set at about upper 1/3 of body, very strongly developed, beginning with collum, regularly declined ventrad much like dorsum (Fig. 1). Collum flabellate, completely covering the head from above, tauriform, anterior half distinctly swollen, posterior half clearly impressed and with 5–6 transverse, irregular rows of small, round, setigerous tuberculations; anterior margin regularly rounded, with 25 indistinct radii, central setigerous lobulations especially inconspicuous compared to more lateral ones; paraterga narrowly rounded caudally, indistinctly lobulate laterally and caudally as well. Postcollum paraterga very broad, each much broader than prozona; anterior margin/shoulder always entire, mostly nearly straight and narrowly bordered, increasingly, but faintly curved caudad towards telson, with neither radii nor crenulations, only anterolateral corner slightly rounded and bearing a particularly small lobulation, followed by three radii and larger lobulations along a subquadrate lateral edge, caudal corner drawn increasingly behind rear tergal margin only in segments 16–19; paraterga 19 produced nearly as far behind as tip of epiproct. Caudal margins of paraterga both radiate and increasingly strongly lobulate laterad, typically with 12+12 setigerous lobulations on each side, regardless of caudolateral ones (Fig. 1). Mid-dorsal parts of metaterga with four transverse, rather regular rows of small, setigerous, round tubercles/knobs, caudal row being especially regular; 1–3 irregular rows of dorsal knobs increasingly obliterated when extended onto distal parts of paraterga. Tergal setae short, light, pointed, usually well visible, 1/4–1/5 as long as metatergite. Neither an axial line nor pleurosternal carinae. Ozopores present anteriorly at least at the very base of paraterga 7 (in a broken body), invisible, pore formula untraceable. Stricture dividing pro- and metazonae broad, shallow and more shining than adjacent metazonae. Limbus brush-like, very densely microspiculate (Fig. 1C, D). Epiproct (Fig. 1A, B, D) conical, slightly emarginate at apex, dorsal and lateral tubercles evident. Hypoproct semi-circular, 1+1 caudal setae clearly separated, borne on evident tubercles (Fig. 1D).

Sternites narrow (Fig. 1C, D), densely setose, clearly impressed along main axis, distinctly broadened only between coxae 7 and 9 (male). Legs long and slender, without modifications (Figs. 1A, C, D, 2A), almost as long as paratergal width; in length, tarsi = femora >> coxae = prefemora = postfemora = tibiae; gonapophyses on coxae 2 small cones (male); neither adenostyles nor tarsal brushes. Claws simple, slightly curved ventrad. Gonopod aperture transversely ovoid, caudal and lateral margins thin and slightly elevated (Fig. 1C).

Gonopods (Figs. 1C, 2B, C) in situ held parallel to each other. Telopodite typically subcircular, very strongly curved caudad, bipartite, with a short, "prefemoral", fimbriate, basal process (**p**) on lateral face. Main, basal part (**b**) of telopodite ribbon-shaped, slightly curved anteriad and subtruncate apically, extended in distal third into a long, solid, subunciform, bare, lateral solenomere (**sl**), the latter at its base bearing a fringed, membranous, hyaline lobe (**l**). A distinct accessory seminal chamber (**a**) and a short duct devoid of a hairy pulvillus lying in distal part of solenophore (**sph**) just opposite **sl,** branch **b** being somewhat longer than branch **sph**.

Remarks. As noted above, the genus *Circulocryptus* Golovatch, 2016 has hitherto been known to contain only two species: *C. fallei* from Vietnam (Golovatch, 2016; Golovatch & VandenSpiegel, 2017), and *C. javanicus* from Java, Indonesia (Golovatch, 2018). The third, new species fails to alter the generic diagnosis as reformulated by Golovatch (2018). This primarily concerns an obviously subcircular, biramous, highly complex gonopodal telopodite that shows an accessory seminal chamber and its duct on a separate solenophorous branch (**sph**) which lies opposite the basal branch (**b**) with a spiniform solenomere (**sl**). The

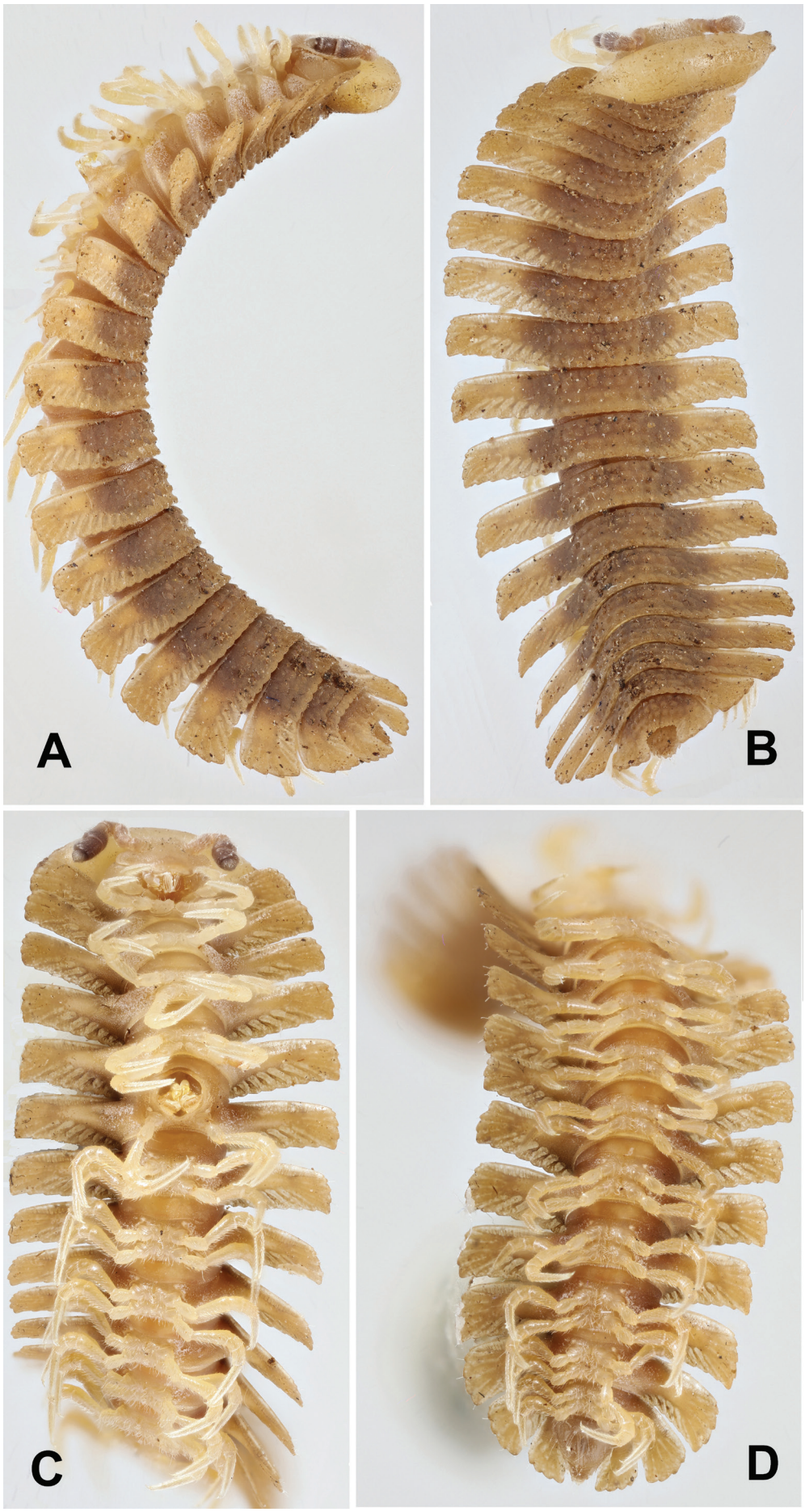

Fig. 1. *Circulocryptus kompantsevi*, new species, holotype. Habitus, A, lateral view; B, dorsal view; C, anteroventral view; D, posteroventral view. Pictures taken not to scale.

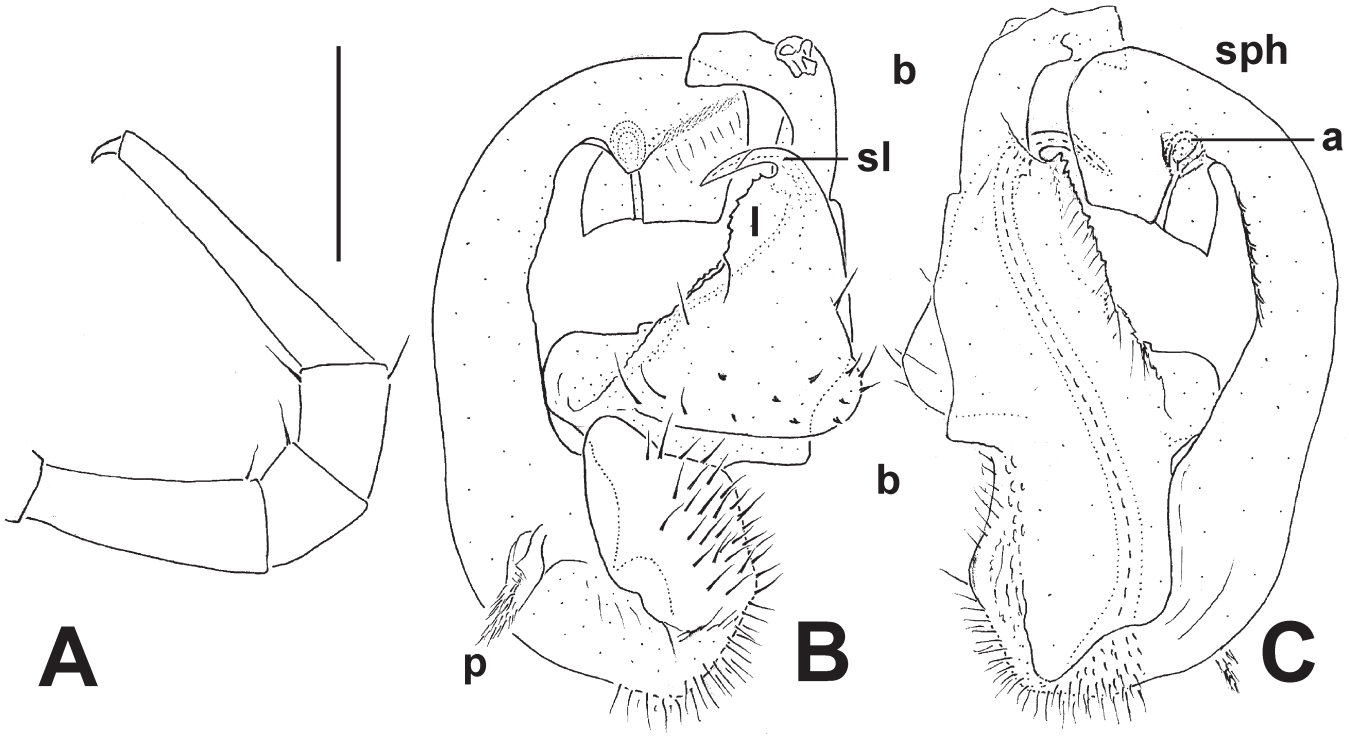

Fig. 2. *Circulocryptus kompantsevi*, new species, holotype. A, Leg 9, lateral view; B, right gonopod, lateral view; C, right gonopod, mesal view. Scale bar = 0.1 mm (A) and 0.2 mm (B, C). Designations: a = accessory seminal chamber; b = basal branch; l = hyaline fringed lobe at base of solenomere; p = prefemoral process; sl = solenomere; sph = solenophorous branch.

presence in *C. kompantsevi*, new species, of a small, but evident gonoprefemoral process (**p**) which is absent from *C. javanicus* and often absent from *C. fallei* also seems characteristic of the genus. Whereas the latter trait is shared with a few other genera of Cryptodesmidae in Southeast Asia (Golovatch, 2016), the former feature is unique not only within the family, but also amongst all known genera of the order Polydesmida (Golovatch, 2018). This alone warrants the promotion of *Circulocryptus* to a cryptodesmid tribe of its own, Circulocryptini, tribus nova, which also includes the new genus described below.

The following key can be proposed to separate all three species of *Circulocryptus* known to date:

1. General colouration light, mostly light brown to yellow (Fig. 1). Collum conspicuously swollen in anterior half and impressed in posterior one (Fig. 1A, B), anterior margin with 25 radii. Postcollum paraterga each with four lateral lobulations, anteriormost of which especially small (Fig. 1). Gonopod with a fimbriate, basal, prefemoral process (**p**) on lateral face, telopodite with branch **b** being somewhat shorter than branch **sph** (Fig. 2). Cambodia. ..... *C. kompantsevi*, new species
– General colouration sometimes dark, red-brown to blackish. Collum not swollen in anterior half. Gonopodal telopodite with branch **b** being somewhat longer than branch **sph**. 2
2. Collum with 29 radii at anterior margin, postcollum metaterga each with 5–6 transverse rows of setigerous tubercles and five lateral lobulations. Tip of branch **b** of gonopodal telopodite retrorse. Java, Indonesia. ..... *C. javanicus*
– Collum with 25 radii at anterior margin, postcollum metaterga each with four transverse rows of setigerous tubercles and four lateral lobulations. Tip of branch **b** of gonopodal telopodite curved forward. Vietnam. ..... *C. fallei*

Carinocryptus, new genus

Diagnosis. A genus of Cryptodesmidae that differs from all other genera of Cryptodesmidae primarily by the peculiar, increasingly high, mid-dorsal, axial rib/carina on postcollum metaterga, coupled with numerous setigerous lobulations and radii at the anterior margin of a typically flabellate collum; a cerotegument crust present on the collum, following metaterga and epiproct; each postcollum metatergum shows several transverse rows of non-differentiated setigerous tuberculations; paraterga are very broad, each paratergum is with an entire anterior margin, a lobulated lateral margin and a multilobate caudal margin; ozopores invisible; the epiproct is conical, the gonopod aperture is obcordate, with slightly elevated lateral and caudal edges; the gonopods in situ are held parallel to each other, with small, squarish, medially fused, very poorly setose coxites and long, slender, typically curved cannulae; the gonopodal telopodites are deeply bipartite and stout, non-circular, both branches being complex and subequal in height, the basal (= main, = caudal) branch has a prominent "prefemoral" (= densely setose) part devoid of any processes and shows a seminal groove running largely on the mesal side, turning laterad only distally before moving onto a distinct, spiniform, simple, retrorse solenomere; the solenophorous (= anterior) branch is more slender and tightly attached to the main branch, with neither a developed accessory seminal chamber nor a hairy pulvillus, but with a long and distinct duct starting at a small node just opposite the solenomere tip and ending up apically on the solenophore.

Type species. *Carinocryptus semenyukae* sp. n.

Name. To emphasise the apomorphic, evident, mid-dorsal carina on postcollum metaterga; masculine in gender.

Remarks. The new genus is highly peculiar in being the sole representative of Cryptodesmidae that shows the mid-dorsal region of postcollum metaterga not flattened, but carrying a conspicuous, increasingly distinct, axial rib. Moreover, the dorsal tegument of the collum, metaterga and epiproct is clothed with a cerotegument crust.

The presence of these two characters, coupled with a flabellate collum that completely covers the head from above, as well as three transverse rows of tuberculations on each postcollum metatergum and lobulated margins of paraterga are likewise characteristic of the family Pyrgodesmidae, but the latter group usually shows two paramedian dorsal ribs and differentiated tuberculations on metaterga, highly varied and often special pore formulae up to ozopores often being borne on porosteles, and there is no tergal setation. In addition, the medially fused gonopods are typically a pair of globose and hypertophied coxites (with short, normal cannulae) that form a more or less deep gonocoel for the usually highly complex, stout and mainly bi- or tripartite telopodites to hinge into. Similarly, members of the family Haplodesmidae sometimes also have an evident rib and/or conspicuous outgrowths mid-dorsally on postcollum metaterga, a cerotegument crust, normal pore formulae and ozopores often borne on porosteles, largely also several transverse rows of tuberculations on metaterga, occasionally even a flabellate collum that completely conceals the head in dorsal view. However, haplodesmids contain numerous volvatory forms with clearly enlarged paraterga 2 (vs. only very few in Pyrgodesmidae and none in Cryptodesmidae) and a relatively small collum (vs. never the case in Pyrgodesmidae or Cryptodesmidae), as well as peculiar, modified, often 2-segmented tergal setae (shared only with numerous Cryptodesmidae), while the gonopods show a pair of medially fused, short, subcylindrical coxites with normal cannulae and no gonocoel, whereas the telopodites are slender, elongate, unipartite and relatively simple. Unlike Haplodesmidae, cryptodesmids are never inclined to volvation and always have a large, flabellate, fan-shaped, anteriorly radiate and lobulate collum that completely covers the head from above, normal (broad) paraterga 2, non-differentiated metatergal tuberculations, usually reduced ozopores and, above all, a pair of short, stout, squarish, medially fused gonopodal coxae with particularly slender and relatively long cannulae, and stout, complex, typically uni- or bipartite telopodites.

Amongst Cryptodesmidae, *Carinocryptus* gen. n. appears to be especially similar to *Circulocryptus* Golovatch, 2016, a small Oriental genus (see above), in sharing bipartite gonopodal telopodites and the same general conformation of their main branches, each of which carries a seminal groove running distad largely on the mesal side before moving onto a spiniform, lateral, retrorse solenomere. Moreover, a slender solenophorous branch opposite the solenomere tip shows either a distinct (*Circulocryptus*) or underdeveloped (*Carinocryptus*, new genus) accessory seminal chamber and an accessory seminal duct, the latter being either very small, short and running ventrad (*Circulocryptus*) or long, strongly developed, directed distad and ending up apically (*Carinocryptus*, new genus). In addition to the above distinguishing somatic characters, the gonopods are subcircular in *Circulocryptus*, vs. subquadrate in *Carinocryptus*, new genus.

As noted above, both these genera are sufficiently disjunct to form the new tribe Circulocryptini, tribus nova, of the family Cryptodesmidae, which is distinguished not only within cryptodesmids, but also among all Polydesmida through the development of both an accessory seminal chamber or its anlage and an accessory seminal duct not at or near a spiniform solenomere, but on a separate, anterior branch opposite the solenomere tip.

Carinocryptus semenyukae, new species
(Figs. 3–5)

Material examined. Holotype male (ZMUM), Vietnam, Gia Lai Province, Kon Ka Kinh National Park, 14°18′08″N, 108°26′41″E, 600–700 m a.s.l., mixed tropical forest, stream valley, steep slope, May 2017, leg. I.I. Semenyuk.

Paratypes: 1 male, 3 females, 2 juveniles (ZMUM), same data, together with holotype.

Diagnosis. With the characters of the genus.

Name. Honours Dr. Irina Semenyuk, the collector.

Description. Length of adults ca 9 (male and two female paratypes) to 9.5 mm (male holotype and one female paratype), width of midbody pro- and metazonae 0.8 and 2.0 mm (male holotype and two female paratypes) or 0.9 and 2.1 mm (one female paratype), respectively. General colouration in alcohol uniformly light creamy brown to dirty brown, only head, venter and legs nearly pallid (Figs. 3, 4). Juveniles completely pallid.

Body with 20 segments. In width, head << collum < segment 2 < 3 < 4 = 14(15); thereafter body gradually tapering towards telson (Figs. 3, 4). Head densely setose nearly throughout, also densely microgranulate between and behind antennae; epicranial suture superficial, more distinct in vertigial region. Antennae very short and densely setose, clearly clavate, C-shaped (Figs. 3D, 4B); in length, antennomere 1 = 2 = 4 = 7 < 3 = 6 < 5; antennomeres 5 and 6 subequally high, each with a small, compact, apicodorsal group of minute bacilliform sensilla. Interantennal isthmus ca 1.8 times broader than diameter of antennal socket.

Tegument dull and clearly microgranulate almost throughout, only prozonae smooth and very finely shagreened; collum, following metaterga and dorsal surface of epiproct clothed with a cerotegument crust. Dorsum strongly and mostly regularly convex; paraterga largely set at about upper 1/3 of body, very strongly developed, beginning with collum, regularly declined ventrad much like dorsum (Figs. 3, 4). Collum flabellate, fan-shaped, completely covering the

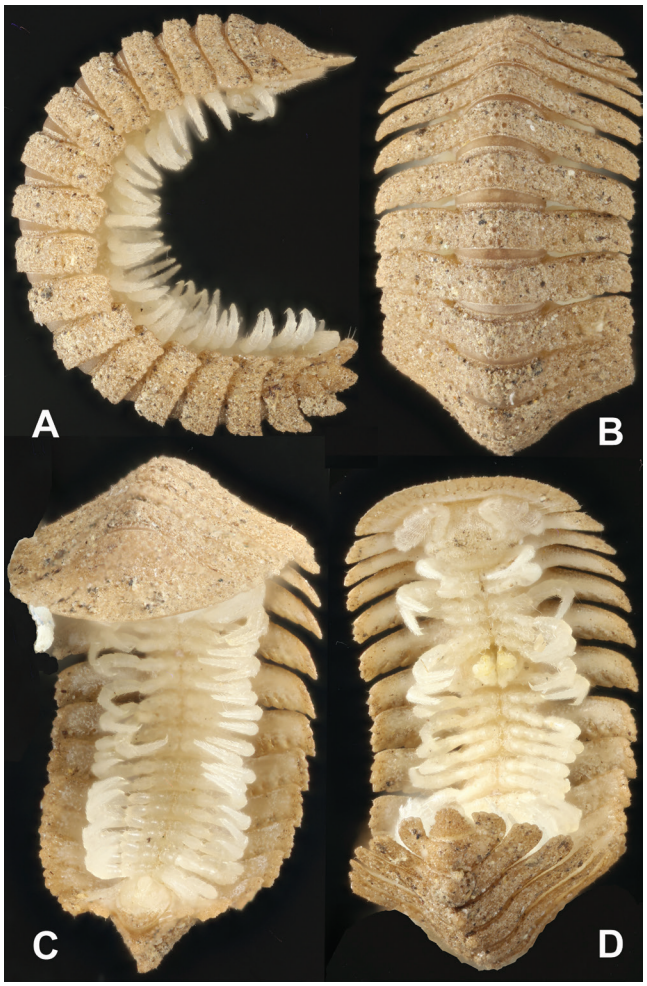

Fig. 3. *Carinocryptus semenyukae*, new species, male paratype. Habitus, A, lateral view; B, dorsal view; C, anteroventral view; D, posteroventral view. Pictures taken not to scale.

Fig. 4. *Carinocryptus semenyukae*, new species, male paratype. Habitus (segment 7 removed), A, dorsal view; B, ventral view. Pictures taken not to scale.

head from above, anterior half flattened and subhorizontal, posterior half regularly rounded and with 5–6 transverse, irregular rows of small, round, setigerous tuberculations; anterior margin regularly rounded, with 23 indistinct radii and 12+12 small, setigerous lobulations. Postcollum metaterga with an increasingly high and distinct axial rib, the latter microtuberculate on top and inclined increasingly caudad in segments 16–18 (Figs. 3A, 4A), a little higher in male compared to female. Postcollum paraterga very broad, mostly squarish, midbody ones about as broad as prozonae; anterior margin/shoulder always entire, mostly nearly straight and narrowly bordered, increasingly, but faintly curved caudad towards telson, with neither radii nor crenulations, anterolateral corner slightly rounded; lateral margin of each paratergum with three radii and four small, subequal, setigerous lobulations, caudal corner drawn increasingly behind posterior tergal margin only in segments 17–19; paraterga 19 produced as far behind as about halfway of epiproct. Caudal margins of paraterga both radiate and increasingly strongly lobulate laterad, typically with 4+4 setigerous lobulations on each side until bases of paraterga, regardless of caudolateral lobulations (Figs. 3, 4). Ventral sides of paraterga more sparsely microtuberculate and microgranulate than both dorsally and laterally. Dorsal parts of postcollum metaterga with three transverse, rather regular rows of small, setigerous, round tubercles/knobs extended until lateral margin. Tergal setae very short, light, pointed, often abraded, but usually well visible, 1/5–1/6 as long as metatergum. Neither pleurosternal carinae nor visible ozopores. Stricture dividing pro- and metazonae narrow and shallow, microgranulate like adjacent parts of metaterga. Limbus brush-like, very densely microspiculate (Fig. 4B). Epiproct (Figs. 3A, C, D, 4) conical, microgranulate and microtuberculate as previous metazonae. Hypoproct semi-circular, 1+1 caudal setae clearly separated, borne on knobs.

Sternites narrow and deep (Figs. 3C, D, 2B), densely setose, clearly broadened only between male coxae 7 and 9. Legs long and slender, slightly enlarged both in male and female, without modifications (Figs. 3, 4B, 5A), almost as long as paratergal width; in length, tarsi = femora >> coxae = prefemora = postfemora = tibiae; gonapophyses on male coxae 2 small cones; neither adenostyles nor tarsal brushes. Claws simple, slightly curved ventrad (Fig. 5A). Gonopod aperture transversely ovoid, caudal and lateral margins thin and slightly elevated.

Gonopods (Figs. 3D, 5B, C) in situ held parallel to each other. Coxite typically short and irregularly subquadrate, distal part with a short, subtriangular, apicomesal lobe,

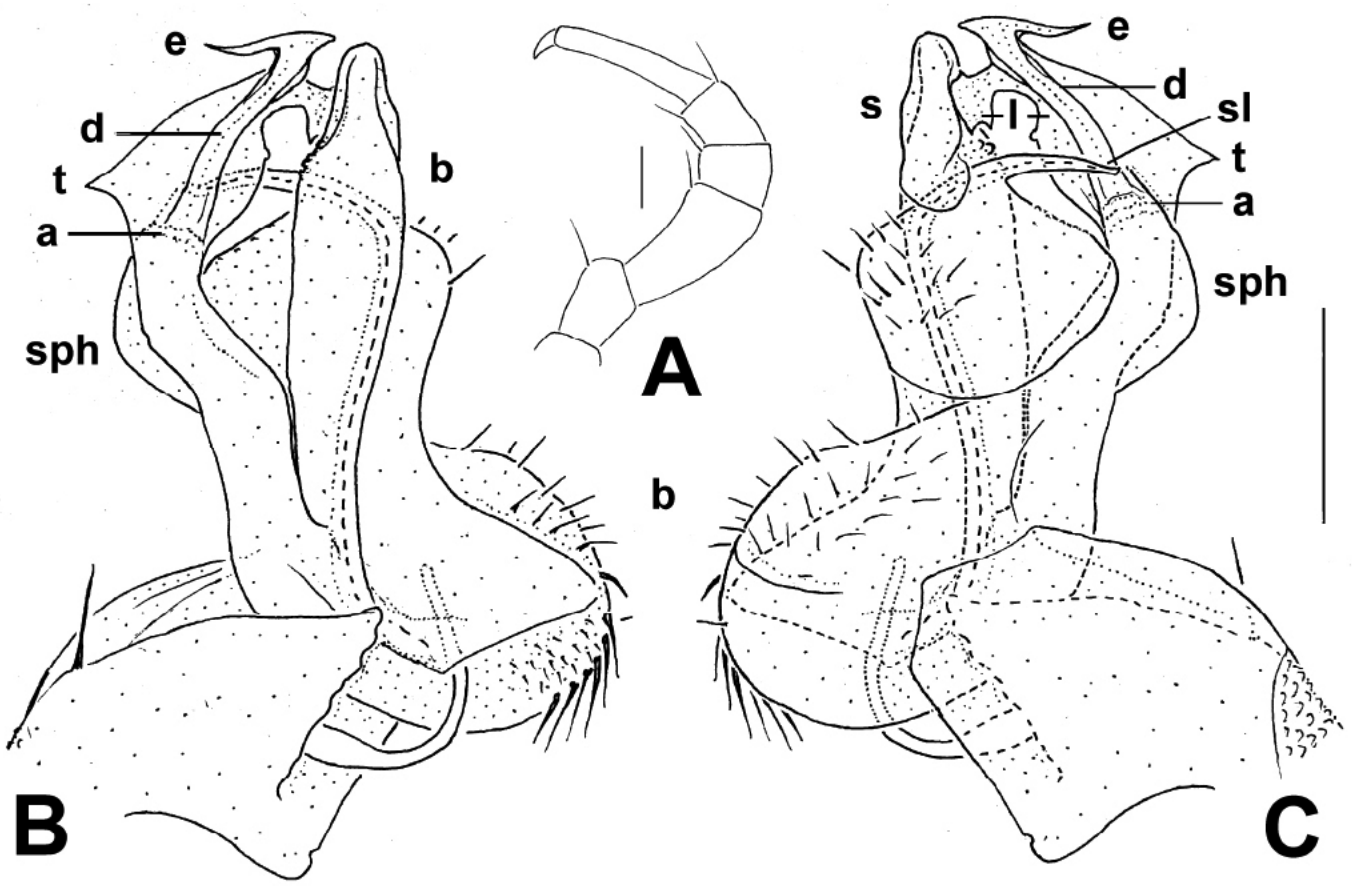

Fig. 5. *Carinocryptus semenyukae*, new species, male holotype. A, Leg 9, lateral view; B, left gonopod, mesal view; C, left gonopod, lateral view. Scale bars = 0.1 mm. Designations: a = anlage of an accessory seminal chamber; b = basal branch; d = seminal duct; e = retrorse tip of seminal duct; l = rugged caudal lobe; s = apical swelling of basal branch; sl = solenomere; sph = solenophorous branch; t = tooth on anterior lobe.

ventroparabasal part microtuberculate and equipped with 1–2 strong setae; cannula as usual, slender, long and unciform. Telopodite subquadrate, stout, clearly bipartite. Basal branch (**b**) caudal in position, with a seminal groove running along mesal face before moving distolaterad onto a prominent, simple, retrorse, spiniform solenomere (**sl**). Part **b** suberect, subdivided into a prominent, rounded, "prefemoral" part, the latter devoid of any processes, densely setose on both sides and set off from a middle, laterally similarly setose and disk-shaped part by a lateral sulcus and a constriction, this part being crowned by **sl**. Distal part of **b** nearly finger-shaped, high, rounded at apex and carrying a prominent, similarly rounded swelling (**s**), the latter overhanging laterad before **sl** base. Caudal branch an anterior solenophore (**sph**), slightly curved caudad, about as high as branch **b**, ribbon-shaped, in distal half with two marginal hyaline membranes, including a rounded anterior lobe with a parabasal tooth (**t**) and a complex, strongly rugged, caudal lobe (**l**). An inconspicuous, but sufficiently evident node (**a**) at base of both **l** and **t**, this node **a** apparently representing an anlage of and homologue to an accessory seminal chamber, the latter lying on **sph** just opposite **sl** tip. A long and very distinct accessory seminal duct leading from **a** to an acuminate and anteriorly recurved **sph** tip.

Remark. Not only the accessory seminal chamber and duct, but even the hyaline lobes on the solenophore of *Carinocryptus semenyukae*, new species, are so strongly reminiscent of those in *Circulocryptus* spp. that these similarities are overwhelming and are simply impossible to neglect when uniting these two genera into a very distinct tribe (see above).

Ophrydesmus anichkini Golovatch, 2015
(Fig. 6)

Ophrydesmus anichkini Golovatch, 2015: 159 (D).
Ophrydesmus anichkini—Golovatch & VandenSpiegel, 2017: 757 (M).

Material examined. 1 male, 2 females (ZMUM), Vietnam, Gia Lai Province, Kon Ka Kinh National Park, 14°18′08″N, 108°26′41″E, 600–700 m a.s.l., mixed tropical forest, stream valley, steep slope up to 45°, on tree trunk, May 2017, leg. I.I. Semenyuk.

Remarks. This species has been described, and hitherto remained known, only from a single male (holotype) from the Cat Tien National Park (N11°26′, E107°21′), Dongnai Province, southern Vietnam (Golovatch, 2015). The above samples come from another province in southern Vietnam and differ from the holotype not so much in size (male ca 10 mm long, 1.0 and 2.7 mm wide on midbody pro- and metazonae, respectively; females ca 11 mm long, 1.2–1.4 and 2.9–3.0 mm wide on midbody pro- and metazonae, respectively, vs. ca 11 mm long, 1.0 and 4.0 mm wide on

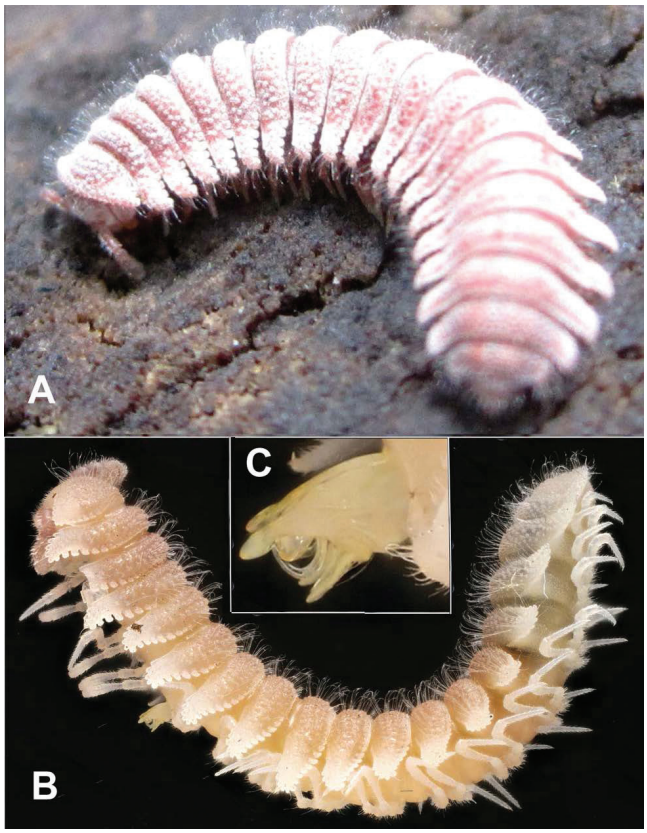

Fig. 6. *Ophrydesmus anichkini* Golovatch, 2015, male from Kon Ka Kinh National Park, Vietnam. A, Live male, dorsal view; B, alcohol-fixed male, lateral view; C, enlarged gonopods, lateral view. Pictures taken not to scale.

midbody pro- and metazonae, respectively, in the holotype) as in colouration. Thus, the holotype shows a peculiar colour pattern: contrasting whitish paraterga on the collum and segment 2 against a dark grey-brown background. Contrariwise, the new samples are uniformly light pinkish both in vivo and in alcohol (Fig. 6A, B) and are completely devoid of a pattern. However, the gonopodal structure is exactly the same (Fig. 6C), thus leaving no doubt about their identity. As a result, this species appears to show remarkable colour variations/morphs, likely at the population level.

***Ophrydesmus kedahensis* (Wang & Tang, 1965)**
(Figs. 7–8)

Phenacoporus kedahensis Wang & Tang, 1965: 425 (D).
Phenacoporus kedahensis—Wang, 1967: 396 (R).
Ophrydesmus kedahensis—Decker, 2013: 15 (R); Golovatch, 2015: 158, 163 (R, D).

Descriptive notes and remarks. This species was originally described as *Phenacoporus kedahensis* Wang & Tang, 1965, from the male holotype coming from "Baling Ledah", likely the town of Baling in the southeastern part of a slightly misspelled state of Kedah, northern Western Malaysia, as well as from a female paratype (allotype) stemming from Singapore (Wang & Tang, 1965). The species name itself, *kedahensis*, clearly suggests its provenance from Kedah. A little later, Wang (1967) recorded another female from Bukit Timah, Singapore, again referring the species to

Fig. 7. *Ophrydesmus kedahensis* (Wang & Tang, 1965), fragmented male holotype from Baling, Kedah, Malaysia. Habitus, A, dorsal view; B, ventral view. Scale bar = 1.0 mm.

Phenacoporus Attems, 1914. Decker (2013) was the first to formally transfer *P. kedahensis* to *Ophrydesmus* Cook, 1896, based on Jeekel (1955) who had synonymised *Phenacoporus* under *Ophrydesmus*, a synonymy Wang & Tang (1965) and Wang (1967) had overlooked.

The original description of this species (Wang & Tang, 1965) had been so poor, and the single sketch of a gonopod so crude, that Golovatch (2015), in his review of *Ophrydesmus,* incorporated *O. kedahensis* and several other, largely female-based cryptodesmid species from Indonesia into that genus only with reservations. Now that the first meaningful illustrations of *O. kedahensis* have become available (Figs. 7, 8), a more solid opinion can finally be expressed.

The length of the body was said to vary from 8 mm (female non-type from Singapore) to 12.5 mm (paratype) or even 13 mm (holotype). The holotype, in ZRC, is fragmented, but complete, with 20 body segments, representing a typical cryptodesmid. The collum is flabellate, completely covering

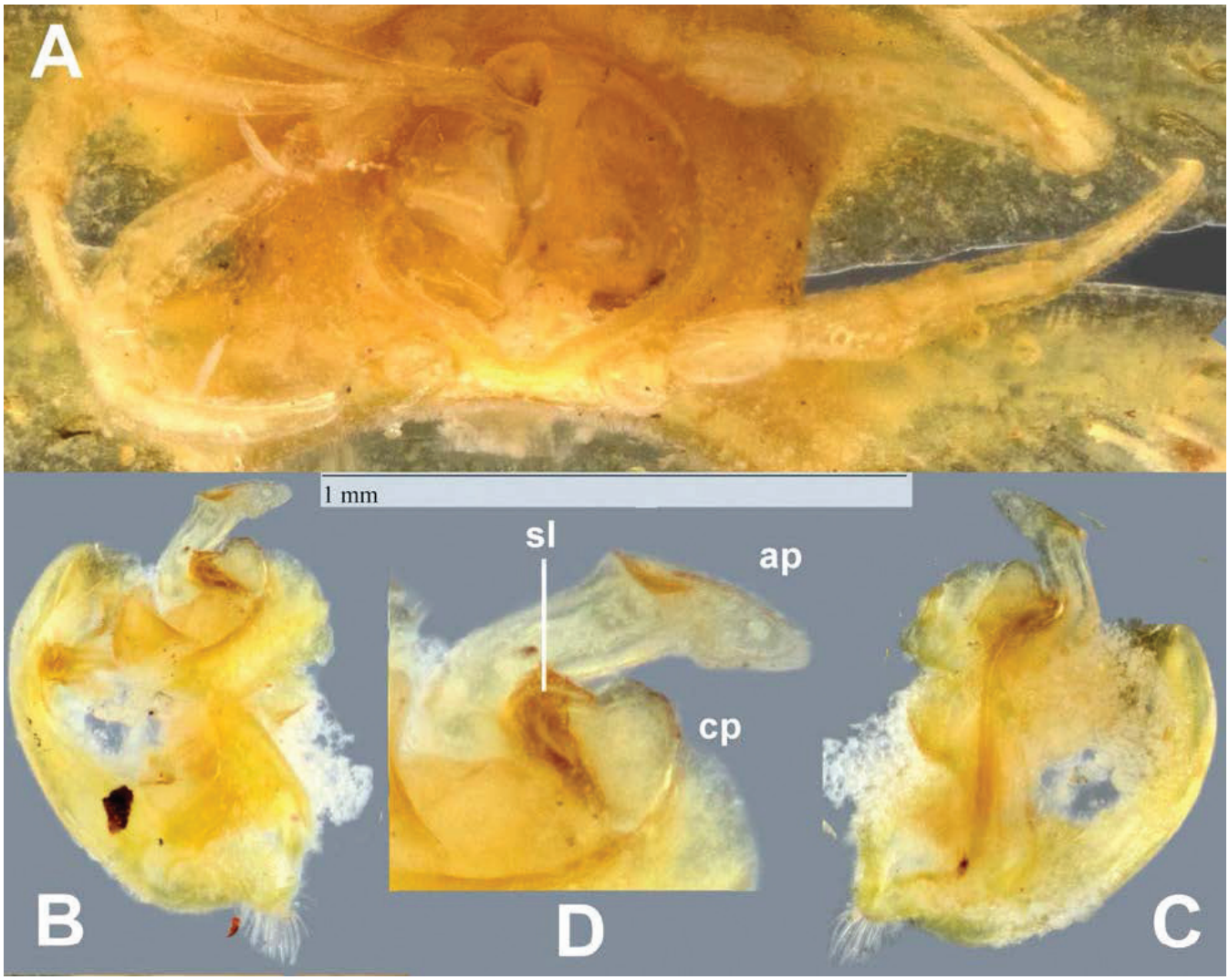

Fig. 8. *Ophrydesmus kedahensis* (Wang & Tang, 1965), male holotype from Baling, Kedah, Malaysia. A, Segment 7 with gonopodal aperture and an intact left gonopod in situ, ventral view; B, removed right gonopod, sublateral view; C, removed right gonopod, submesal view; D, enlarged telopodite of left gonopod, submesal view. Scale bar = 1.0 mm (A–C) or not to scale (D). Designations: ap = anterior process; cp = posterior process; sl = solenomere.

the head from above, with 10+10 faint lobulations and 19 radii at the anterior margin. Each postcollum metatergum is with four transverse rows of small, squarish, setigerous, non-differentiated tuberculations only partly extending onto paraterga; each postcollum paratergum is with a faintly bordered, slightly and regularly rounded anterior margin/shoulder increasingly clearly declined caudally only on segments 14–19; the lateral margin of each paratergum bears four small setigerous lobulations, the anterolateral corner being mostly narrowly rounded and squarish; the caudal margin is with 7+7, laterad increasingly evident, setigerous lobulations between the caudolateral ones and the bases of paraterga (Fig. 7).

Male femur 3 is clearly inflated (Fig. 7B), sternal cones seem to be present.

The gonopods (Fig. 8) are relatively simple, in situ held parallel to each other; the telopodites are distinctly biramous, the anterior branch (**ap**) being much larger, higher, curved caudad, slightly enlarged and folded distomesally, broadly rounded at the apex. The caudal branch (**cp**) is considerably lower, smaller, roundish and even more simple than **ap**, with a folded seminal groove/solenomere (**sl**) being visible at the bottom between both **ap** and **cp**. The gap between **ap** and **cp** is deep and considerable.

The above characters, particularly the gonopodal conformation and the presence of an inflated male femur 3, are definitely evidence of the correct assignment of *O. kedahensis* to *Ophrydesmus*. Moreover, its affinities to the first four congeners that Cook (1896) originally described from Java, Indonesia are especially clear, as they all share inflated male femora 3 and evident sternal cones (Attems, 1940; Golovatch, 2015): *O. gede* Cook, 1896 (the type species of *Ophrydesmus* and a junior synonym of *O. weberi* (Pocock, 1894), the latter taxon the type species of *Phenacoporus*, synonymised by Jeekel (1955), *O. pugnus* Cook, 1896, *O. scaurus* Cook, 1896, and *O. tengger* Cook, 1896. Among these, only *O. weberi* is known to occur partly sympatrically with *O. kedahensis*, i.e., western Java, Indonesia and Singapore (Decker, 2013). However, both are distinct enough through the former species

showing a larger body (16–20 mm long and 4.0–5.0 mm wide on midbody pro- and metazonae, respectively), mostly five transverse rows of metatergal tuberculations and the gonopodal telopodites clearly less strongly excavate between both branches, the basal (= caudal, or main) of which is much smaller and different in shape (Attems, 1940). Based on the available key (Golovatch, 2015). *O. kedahensis* is sufficiently distinct from the other congeners as well.

As a result, *O. kedahensis* is an independent species, Golovatch's (2015) key to *Ophrydesmus* spp. holds basically valid, but *O. kedahensis* must be transferred inside couplet 5(6) which unites the congeners characterised by inflated male femora 3 and the presence of sternal cones.

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