**RHYUKYUSPATHIUS**, A NEW PECULIAR GENUS OF THE TRIBE SPATHIINI (HYMENOPTERA: BRACONIDAE: DORYCTINAE) FROM JAPAN

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Abstract.—A new genus from the Ryukyu Islands of Japan belonging to the braconid wasp subfamily Doryctinae, *Rhyukyuspathius* gen. nov., with its type species, *R. spinifer* sp. nov., is described and illustrated. The position of this genus in the tribe Spathiini sensu stricto and its morphological similarities with other genera are discussed.

Key words.—Hymenoptera, Braconidae, Doryctinae, new genus and species, parasitoids, Ryukyu Islands.

**INTRODUCTION**

With over 250 species belonging to 17 genera and taxa recorded from all zoogeographic regions, the tribe Spathiini sensu lato represents one of the largest supergeneric taxa of the polymorphic and worldwide distributed braconid wasp subfamily Doryctinae. Most of the diversity from this tribe, however, was contained by the mainly Old World distributed genus *Spathius* Nees, 1819, which has more than 200 described species recorded to this date (Nixon 1943, Chao 1956, 1977, 1978, Belokobylskij 2003, Chen and Shi 2004).

The main diagnostic character that was traditionally regarded to distinguish the members of the Spathiini was the presence of a considerably elongated first metasomal tergite transformed in petiole. The petiolate first tergites with very long its acrosternite was also regarded to be the only known reliable putative synapomorphy for this tribe (Belokobylskij 1992), since all the other proposed morphological synapomorphies (e.g. first metasomal tergite with distinct abrupt apical dilatation, postfurcal position of recurrent vein (m-cu) of fore wing, subinterstitial position of parallel vein (2CUb): Nixon 1943) considerably varied among its members.

Recently, two molecular phylogenetic studies were carried out (Zaldivar-Riveron et al. 2007, 2008) including a vast number of species belonging to 50 and 64 doryctine genera, respectively, from the all continents. Among other findings, these studies demonstrated that a considerably elongated acrosternite of the petiolate or subpetiolate first metasomal tergite independently evolved within the Doryctinae in at least seven separate lineages. Strikingly, some of these lineages were represented by genera belonging to the Spathiini (Spathius, Psenobolus Reinhard, 1885, Notiospathius Matthews et Marsh, 1973, Tarasco Marsh, 1993, etc.). The latter tribe was therefore concluded to be actually polyphyletic, leaving it only represented by *Spathius* (Spathiini sensu stricto), though it also probably contains some other Old World genera with petiolate first metasomal tergite that were not examined in the above studies (Parana Nixon, 1943, Toka Nixon, 1943, Paraspathius Nixon, 1943, Spathioplites Fischer, 1962, Afrospathius Belokobylskij et Quicke, 2000, Hemispathius Belokobylskij et Quicke, 2000, etc.).

Here, a new doryctine genus, *Rhyukyuspathius* gen. nov., with its type species *R. spinifer* sp. nov., from the Ryukyu Islands of Japan (Okinawa I.) is
described. This genus appears to be closely related to *Spathius* and therefore is placed within the Spathini *s. s.* subject to further confirmation. It possesses several peculiar external morphological features, including the metanotum with long pointed tooth, propodeum with pair of long and curved inward lateral processes, eye with distinct and sparse setae, middle tibia without spines. It also additionally has a very posterior position of the parallel vein (2CUb) of fore wing in comparison with the second abscissa of cubital (1CUb) vein, long submedial (subbasal) cell of hind wing, and mostly smooth mesoscutum. Terminology of morphological features, measurement and sculpture follows Belokobylskij and Tobias (1998). The wing venation nomenclature follows Belokobylskij and Tobias (1998) and Sharkey and Wharton (1997) (in parentheses). The following abbreviations are used:

POL – postocellar line,
OOL – ocular-ocellar line,
Od – maximum diameter of lateral ocellus,
C – vertical groove crossing propodeum and metapleuron.

The holotype of the new species is kept in the National Institute of Agro-Environmental Sciences (Tsukuba, Japan).

**TAXONOMY**

*Ryukyuspathius* gen. nov.

**Type species.** *Ryukyuspathius spinifer* sp. nov.

**Etymology.** From the name of the Ryukyu Islands, where it was collected, and the generic name *Spathius*.

**Diagnosis.** *Ryukyuspathius* gen. nov. resembles *Spathius* Nees, but differs from it in having the metanotum with long, thick basally and distinctly pointed median tooth, the propodeum with long, thick and apically weakly curved inward lateral processes, the parallel vein (2CUb) arising from posterior 0.3 of apical side of brachial (first subdiscal) cell, the submedial (subbasal) cell of hind wing large and with first abscissa of mediocubital vein (M+CU) almost as long as second abscissa (1M), the eye with long and sparse setae, the mesoscutum mostly smooth, and the middle tibia without spines.

Propodeal processes are also known in the Polynesian genus *Fijispispathius* Belokobylskij, Iqbal et Austin (Belokobylskij *et al.*, 2004), but the new genus differs from it in having the metanotum with a long and distinctly pointed median tooth, the parallel vein (2CUb) arising from posterior 0.3 of apical side of brachial (first subdiscal) cell, the submedial (subbasal) cell of hind wing large and with first abscissa of mediocubital vein (M+CU) almost as long as second abscissa (1M), and the eye with distinct and sparse setae.

The smooth mesoscutum, the parallel vein (2CUb) arising distinctly behind the middle of apical side of brachial (first subdiscal) cell and the large submedial (subbasal) cell of hind wing are also known in Palaeartic and Australasian genus *Spithiomorpha* Tobias (Tobias 1976); however, *Ryukyuspathius* gen. nov. differs from the latter in having the metanotum with long, thick basally and distinctly pointed median tooth, the propodeum with thick and apically weakly curved inward lateral processes, the recurrent vein (m-cu) of fore wing postfurcal, the eye with distinct and sparse setae, and the middle tibia without spines.

**Description.** Head transverse (Fig. 2), not depressed (Fig. 3). Antennal sockets distinctly separated from each other. Frons almost flat, without median keel or furrow. Ocelli arranged in equilateral triangle. Eye with distinct and sparse setae, without emargination opposite antennal sockets. Occipital carina coarse, complete dorsally, joined below with hypostomal carina. Malar suture absent. Clypeus distinctly convex (Fig. 3), with short lower flange; clypeal suture complete. Face above clypeus with 2 distinct and narrow depressions (Fig. 1). Postgenal bridge very narrow. Maxillary palpus long, 6-segmented, labial palpus short, 4-segmented. Third segment of labial palpus not shortened. Antenna (Fig. 4) with scape thick and short, without apical lobe and basal constriction. First flagellar segment subcylindrical, almost straight, longer than second segment. Apical segment pointed apically and without spine.

Mesosoma not depressed (Fig. 5). Prothorax rather short. Pronotal carina absent, but coarse subanterior carina present (dorsal view). Sides of pronotum with more or less delineated wide median groove. Posterior propopleural lobe wide. Mesonotum highly and perpendicularly elevated above pronotum, almost entirely smooth. Median lobe of mesonotum wide and with distinct anterolateral shoulders. Notauli deep, wide and complete (Fig. 6). Prescutellar depression long and deep; distinct wing-like flanges developed laterally on level of depression. Scuto-scutellar suture distinct. Metanotum with long, thick basally and distinctly pointed apically median tooth. Mesopleural pit deep, rather short and narrow. Sternaulus more or less deep, wide, running along almost entire lower part of mesopleuron. Prepectal carina coarse and complete. Postpectal carina absent. Metapleural flange relatively long, wide basally, rounded apically. Propodeum (Fig. 7) with areas distinctly delineated by carinae, with long, thick and apically weakly curved inward lateral processes; propodeal bridge absent. Propodeal spiracle small and rounded. Metapleural suture distinct. Subanterior vertical groove crossing propodeum and metapleuron wide and very deep.
Figures 1–11. Morphological features of *Ryukyuspathius spinifer* gen and sp. nov. (1) Head, front view; (2) head, dorsal view; (3) head, lateral view; (4) basal and apical segments of antenna; (5) mesosoma, lateral view; (6) mesonotum; (7) propodeum, dorsal view; (8) part of fore wing, place of the connection of recurrent (m-cu) and first radiomedial (2RS) veins; (9) part of fore wing, brachial (first subdiscal) cell; (10) fore wing; (11) hind wing.
Wings. Pterostigma of fore wing short and wide (Fig. 10). Radial (marginal) cell weakly shortened. Both radiomedial veins (2RS and r-m) present. Recurrent vein (m-cu) weakly postfurcal (Fig. 8). Nervulus (cu-a) distinctly postfurcal. Discoidal (first discal) cell long and more or less narrow, distinctly petiolate anteriorly. Basal (1M) and recurrent (m-cu) veins parallel. Parallel (2CUb) vein arising from posterior 0.3 of apical side of brachial (first subdiscal) cell (Fig. 9). Brachial (first subdiscal) cell closed postero-apically by brachial (2cu-a) vein. Hind wing (Fig. 11) with 3 hamuli. First abscissa of costal vein (C+Sc+R) 0.75 times as long as second abscissa (Sc+R). Radial (RS) vein arising from costal (R) vein closely to basal (1r-m) vein. Radial (marginal) cell almost parallel-sided, without additional transverse vein (R). Medial (basal) cell large, distinctly widened towards apex. Nervellus (cu-a) present. Submedial (subbasal) cell large; first abscissa of mediocubital vein (M+CU) almost as long as second abscissa (1M). Recurrent vein (m-cu) present.

Legs. Fore tibia with several long and narrow spines arranged in row. Middle tibia without spines. Hind coxa with baso-ventral corner and small tooth (Fig. 12). Hind femur subclavate, without dorsal protuberance (Fig. 14). Hind tibia without spines on apical outer margin, with area of very dense setae on inner apical part. Spurs of hind tibia short, slender and setose. Hind basitarsus ventrally with narrow keel, 0.65 times as long as second-fifth segments combined. Claws rather large.

Metasoma. Petiole arched (Fig. 16), with distinct subbasal lateral processes and small dorsopore, with distinct spiracular tubercles in basal 0.35 (Fig. 17); acrosternum 0.7 times as long as first tergite. Second tergite without areas and furrows (Fig. 17); second suture absent. Second and third tergites without separate laterotergites. Ovipositor subapically with single dorsal nodes, more or less distinctly serrate ventro-apically (Fig. 15).

**Distribution.** Ryukyu Islands.

*Ryukyuspathius spinifer* sp. nov. 
(Figs 1–17)


Figures 12–17. Morphological features of *Ryukyuspathius spinifer* gen and sp. nov. (12) Hind coxa; (13) hind tibia; (14) hind femur; (15) apex of ovipositor; (16) petiole, lateral view; (17) metasoma, dorsal view.
Description. Body length 4.0 mm; fore wing length 2.8 mm. Head width 1.5 times its median length, 1.3 times width of mesoscutum. Head behind eye (dorsal view) distinctly roundly narrowed. Transverse diameter of eye 1.4 times length of temple. Ocelli medium-sized; POL almost equal to Od, 0.35 times OOL. Eye 1.25 times as high as broad. Malar space height 0.4 times eye height and 0.85 times basal width of mandible. Face width equal to eye height and 1.2 times height of face and clypeus combined. Clypeal suture deep, additionally marginated by carina. Hypoclypeal depression rather large and round, its width almost equal to distance from edge of depression to eye, 0.45 times width of face. Hypostomal flange wide. Vertex convex.

Antenna filiform, slender, 30-segmented, 0.9 times as long as body. Scape 1.6 times longer than its maximum width. First flagellar segment 3.5 times longer than its apical width, 1.15 times longer than second segment. Penultimate segment twice longer than wide, 0.5 times as long as first segment, 0.8 times as long as apical segment.

Mesosoma. Mesosoma 1.8 times longer than height. Subanterior transverse carina of pronotum (dorsal view) connected medially with anterior curved up flange by short and distinct keel. Lateral pronotal depression quite shallow, densely and coarsely crenulate. Median lobe of mesoscutum distinctly protruding forwards, rounded anteriorly, its maximum width 1.1 times median length. Notauli coarsely crenulate. Prescutellar depression with high median carina, mostly smooth, 0.4 times as long as scutellum. Scutellum convex, with lateral carinae. Subalar depression shallow, rather narrow, coarsely rugose-striate. Sernaunus wide anteriorly and narrow posteriorly, weakly curved, coarsely rugose-crenulate. Metapleural flange wide and long.

Wing. Fore wing about 4.0 times longer than wide. Pterostigma 3.5 times longer than its maximum width. Radial (r) vein arising behind middle of pterostigma, its inner margin from parastigma to radial vein (r) 1.2 times inner margin from radial vein (r) to metacarpus (R1). Metacarpus (R1) 1.3 times longer than pterostigma. First radial abscissa (r) 0.5 times as long as maximum width of pterostigma. Second radial abscissa (3RSa) almost 5.0 times longer than first abscissa (r) and forming with it obtuse angle, 0.6 times as long as the straight third abscissa (3RSb), 1.5 times longer than first radiomedial vein (2RS). Second radiomedial (second submarginal) cell not narrowed distally, its length 3.2 times maximum width, 1.4 times length of brachial (first subdiscal) cell. First medial abscissa ((RS+M)a) weakly sinuated. Distance from nervulus (cu-a) to basal vein (1M) 1.3 times nervulus (cu-a) length. Mediaucubital vein (M+CU) very weakly curved to anal vein (1A) in distal half. Hind wing 5.5 times longer than its maximum width. Recurrent vein (m-cu) pigmented, long, antefurcal, strongly curved towards base of wing.

Legs. Middle tarsus long. Hind coxa 1.8 times longer than wide. Hind femur almost 4.0 times longer than wide. Hind tarsus 0.9 times as long as hind tibia. Second segment of hind tarsus 0.5 times as long as basitarsus, twice longer than third segment, 1.3 times longer than fifth segment (without pretarsus).

Metasoma 1.1 times longer than head and mesosoma combined. Petiole (lateral view) distinctly curved ventrally and dorsally, weakly thickened medially, distinctly widened in apical quarter (dorsal view). Length of petiole 2.4 times its apical width, 1.6 times length of propodeum, 0.7 times as long as rest of metasoma; apical width of petiole 1.5 times its width at level of spiracles, 2.2 times its minimum width. Median length of second and third tergites combined 1.3 times basal width of second tergite, 0.8 times their maximum width. Ovipositor sheath 2.2 times longer than petiole, 0.6 times as long as fore wing, 0.8 times as long as metasoma, 1.3 times longer than mesosoma.

Sculpture and pubescence. Vertex, frons and temple entirely smooth; face rugose-striate medially and smooth laterally, clypeus rugose. Mesoscutum mostly smooth, with coarsely rugose area in medioposterior 0.7. Scutellum mostly smooth, finely punctate, but rugulose laterally. Mesopleuron punctate to smooth in median area, distinctly rugose-areolate in lower 0.3. Metapleuron entirely coarsely rugose-crenulate. Propodeum mostly coarsely rugulose-crenulate, basolateral areas densely granulate-crenulate, rather widely rugulose along carinae; basal carina long, about 0.4 times of propodeum and 2.5 times longer than anterior fork of areola; areola narrow and long; petiolate area long, narrow and distinctly separated from areola. Hind coxa almost entirely coarsely rugulose-crenulate, with rather fine transverse striae postero-dorsally. Hind femur mostly smooth, dorsally rugulose. Petiole rugulose-crenulate in basal 0.7, smoothly striate in apical 0.3. Remaining tergites smooth. Whole vertex with sparse long and almost erect setae. Mesoscutum with sparse, long and erect setae arranged more or less narrow stripes along notauli and laterally, glabrous on median parts of all lobes. Setae on dorsal surface of hind tibia long, almost erect and rather dense, its length 1.0–1.4 times maximum width of tibia.

Colour. Body dark reddish brown with blackish patches, metasoma behind petiole reddish brown. Antenna brown, black apically, scape and pedicel yellowish brown. Palpus yellow. Legs reddish brown, partly infuscate, fore and middle coxa and all trochanters and trochantelli brownish yellow, middle and hind tibiae yellowish basally. Ovipositor sheath mostly brown to dark brown, yellowish brown basally. Wings evenly faintly infuscate. Pterostigma dark brown, paler basally and apically at short distances.
Male unknown.

**Distribution.** Japan (Ryukyu Is.).

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**REFERENCES**


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