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The Identity of the Japanese Species of the Genus *Paracymus* Thomson (Coleoptera, Hydrophilidae)

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Abstract Two species of the genus *Paracymus* Thomson, 1867 have been recorded from Japan: *P. evanescens satsumanus* Matsui, 1986 and *P. orientalis* Orchymont, 1925. I confirmed the identity of Japanese representatives of *Paracymus* and two species were recognised: *P. orientalis* (=*P. evanescens satsumanus* syn. nov.) and *P. aeneus* (Germar, 1824), the latter of which is a newly recorded species. These species are distinguishable by the body size, ground punctures on the pronotum and elytra, mesoventral projection, and male genitalia. Photographs and illustrations of taxonomically important characters, and a key to the Japanese species are provided.
Key words: aquatic beetles, water scavenger beetles, taxonomy, synonym, *aeneus*, *evanescens*, *satsumanus*, *orientalis*, new record, salt marsh.

Introduction

The genus *Paracymus* Thomson, 1867 comprises of 81 species from around the world (Short & Fikáček, 2011). *Paracymus* was considered to be a member of the tribe Anacaenini (Hansen, 1991); however, morphological and molecular phylogenetic studies have casted doubt on the phylogenetic position of *Paracymus* (Komarek & Beutel, 2007; Short & Fikáček, 2013). Short and Fikáček (2013) therefore transferred the genus from the Anacaenini to the *Paracymus*-group of the tribe Laccobiini.

Two species of *Paracymus* have been recorded from Japan: *Paracymus orientalis* Orchymont, 1925 and *P. evanescens satsumanus* Matsui, 1986 (Hansen, 1999). Wooldridge (1977), a comprehensive revision of the Oriental *Paracymus*, mentioned the occurrence of *P. orientalis* in Japan as well as *P. evanescens* Sharp, 1890 as an endemic species in Ceylon. This taxonomic treatment has followed in the following catalogues (e.g., Hansen, 1999, 2004). However, the Japanese *Paracymus* species have been considered as *Paracymus evanescens* by many Japanese authors (e.g., Nakane, 1963, 1970; Satô, 1985 a, b; Sasaki *et al*, 2002; Satô & Yoshitomi, 2005). In addition, during this period, a subspecies *P. evanescens satsumanus* was described by Matsui (1986). For these reasons, the previous records of the Japanese *Paracymus* have confused the identification of these species, *P. evanescens* and *P. orientalis*. The identity of *P. evanescens satsumanus* is still unclear, because the subspecies *P. evanescens satsumanus* may be described based on a comparison between specimens of *P. orientalis* from the Nansei Islands (Ryukyu Islands in its broad sense) and those from the mainland Kagoshima Prefecture, which is the southernmost area of the Kyushu mainland.

In addition, a short series of *Paracymus* specimens were collected from a marsh adjacent to the sea and were identified as *P. aeneus* (Germar, 1824). These specimens represent the first record of the species from Japan.

In the present paper, I confirm the identity of the Japanese species of *Paracymus* and record *P. aeneus* from Japan.

Materials and Methods

The methods largely follow those used by Minoshima (2009). Observations were carried out using an Olympus SZX12 binocular microscope, and an Olympus BX41 and a Nikon Eclipse E600 compound microscopes. Photographs were taken using an Olympus E-PL5 digital camera attached to the SZX12. SEM observations were carried out using a Hitachi S-3000N scanning electron microscope. Photographs were subsequently adapted in Adobe Photoshop Lightroom 5 and Photoshop CC. Composite images were created using the focus stacking software CombineZP (Hadley, 2010). Morphological terminology largely follows Hansen (1991), Komarek (2004), and Lawrence *et al.* (2011). Taxonomy and nomenclature follow Short and Fikáček (2013).

Abbreviation of the depositories of the specimens examined are as follows: EUMJ – Ehime University Museum, Matsuyama, Japan (H. Yoshitomi); HGF – Hoshizaki Green Foundation, Izumo, Japan (M. Hayashi); KMNH – Kitakyushu Museum of Natural History and Human History, Kitakyushu, Japan (Y. Minoshima); NMPC – National Museum, Prague, Czech Republic (M. Fikáček, J. Hájek); OYC – Osamu Yamaji collection (Okayama, Japan); SSC – Shun'ichi Sakurai collection (Sakata, Japan).

Results

Genus ***Paracymus*** Thomson, 1867

Diagnosis. The Japanese *Paracymus* are easily distinguishable from other Japanese Hydrophilidae by the following characters: (1) dorsal surface of body black; (2) antenna with eight antennomeres; (3) maxillary palpus short, as long as or shorter than antenna; (4) mesoventrite with a distinct projection pointed apically; (5) elytra with sutural stria; (6) elytra without rows of serial punctures; (7) abdomen with five ventrites.

Paracymus aeneus (Germar, 1824)

(Figs. 1A, C–D, 2A)

Hydrophilus aeneus Germar, 1824: 96 [type locality: Russia, Kizlyar].
[For detail synonymy, see Hansen (1999).]

Material examined. JAPAN: Honshu: Okayama Pref.: 3 exs. (HGF, KMNH, OYC), Kinkai-enden-atochi, Setouchi-shi, 28−IV−1996, O. Yamaji leg.; 3 males and 3 exs. (KMNH, NMPC), ditto but 14−VIII−1999, light trap.

Additional material examined. UKRAINE: 2 exs. (KMNH), Saki, Crimea, 2−V−2000, no collector data. GERMANY: 1 ex. (KMNH), Altenteil, Fehmarn, Schleswig-Holstein, 14−VII−2006, C. Kerkering leg.

Diagnosis. See below key.

Remarks. This species is widely distributed in the Palaearctic Region (see below) and may be a rare species in Japan. Only a limited number of this species has been collected at light from a single locality, Kinkai-enden-atochi in Okayama Prefecture, which was one of the largest saltpans in Asia (five million square metres) until 1971. This area was then converted into a final waste landfill site. After the closure of the saltpan, this area had been reclaimed and a large salt marsh developed in this region. This species prefer salt marshes (Greenwood & Wood, 2003; Wood *et al.*, 2003) and was collected together with *Enochrus bicolor* (Fabricius, 1792) in the locality (Y. Minoshima, personal

Fig. 1. Dorsal and lateral habitus (A–B) and SEM photographs of mesoventral projection (C–F). —— A, C–D, *Paracymus aeneus* (Germar, 1824); B, E–F, *P. orientalis* Orchymont, 1925; C, E, lateroventral view, D, F, lateral view. Arrows indicate a longitudinal lamina connecting mesoventral projection and between mesocoxae.

observation), as these species also found to cohabit in the European salt marshes (e.g., Greenwood & Wood, 2003).

Distribution. *Paracymus aeneus* is widely distributed in the Palaearctic Region: Europe, North Africa and Asia (e.g., Hansen, 1999; Ruta *et al.*, 2006). Here, I provide the first record from Japan (Okayama Prefecture).

Paracymus orientalis Orchymont, 1925

(Figs. 1B, E–F, 2B)

Paracymus evanescens: Nakane, 1963: 63, pl. 32; Nakane, 1970: 27; Satô, 1985 a: 213, pl. 38; Satô, 1985 b: 249; Satô & Saito, 1989: 245; Sasaki *et al.*, 2002: 174; Satô & Yoshitomi, 2005: 630. [misidentification].

Paracymus evanescens-orientalis Orchymont, 1925: 201 [type locality: Philippines, Luzon Island, Manila; lectotype designation by Wooldridge (1975)].

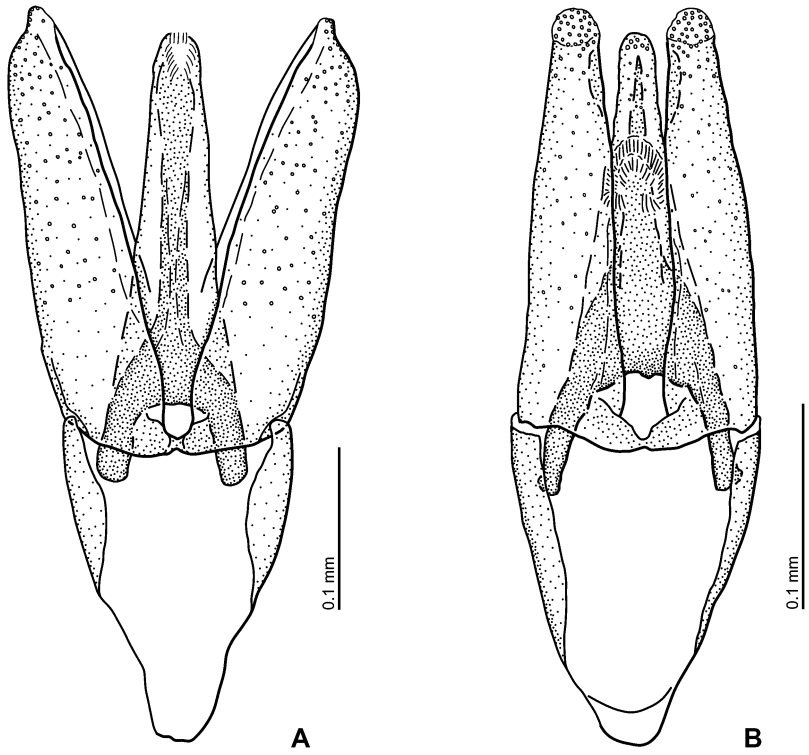

Fig. 2. Male genitalia, dorsal view. —— A, *Paracymus aeneus* (GERMAR, 1824); B, *P. orientalis* ORCHYMONT, 1925.

Paracymus orientalis: WOOLDRIDGE, 1975: 20; WOOLDRIDGE 1977: 124; HANSEN, 1999: 112; HANSEN, 2004: 46.

Paracymus evanescens satsumanus MATSUI, 1986: 88 [type locality: Japan, Kyushu, Kagoshima Pref., Kouyama-chô]; HANSEN, 1999: 110; HANSEN, 2004: 46. **Syn. nov**.

Material examined. JAPAN: Shikoku: Kôchi Pref.: 1 male (KMNH), Nyûta, Shimanto-shi, 16–XI–2004, M. MORI leg. Kyushu: Fukuoka Pref.: 1 ex. (KMNH), Wakamatsu-ku, Kitakyushu-shi, 30–III–2010, M. KITANI leg. Nansei Is.: Kagoshima Pref.: Tokara Is.: Takara-jima Is.: 1 ex. (EUMJ), 10–VI–1962, M. SATÔ leg.; 1 ex. (EUMJ), 3–VII–1960, M. SATÔ leg., *Crenitis osawai tokarana*, M. SATÔ det., 1985; Okinawa Pref: Daitô Isls.: Minami Daitô-jima Is.: 1 ex. (EUMJ), 25−VII−1965, Y. HAMA leg.; 1 ex. (KMNH), Amida-ike, 10–III−1991, S. NOMURA leg.; 2 exs. (EUMJ), Hyôtan-ike, 9–III–1991, S. NOMURA leg.; 3 exs. (KMNH), Zaisyo, 25°49.942′N, 131°14.511′E, 18−III−2005, Y. MINOSHIMA leg.; 1 ex. (KMNH), Daitô-jinja, 25°50.511′N, 131°13.674′E, 8−XII−2005, Y. MINOSHIMA leg.; 1 ex. (EUMJ), Daitô-jinja, 9–III−1991, S. NOMURA leg.; 2 males, 15 exs. (HGF, KMNH, NMPC, OYC), Ikenosawa, 25°51.334′N, 131°13.960′E, 11−XII−2005, Y. MINOSHIMA leg.; 6 exs. (KMNH), Kyutô, 25°50.668′N, 131°14.461′E, 11−XII−2005, Y. MINOSHIMA leg.; 1 ex. (KMNH), ditto but 25°50.405′N, 131°14.678′E; 4 exs. (KMNH), Kita, 25°51.018′N, 131°14.062′E, 11−XII−2005, Y. MINOSHIMA leg.; 1 ex. (KMNH), ditto but 25°51.006′N, 131°14.338′E, 12−XII−2005. Yaeyama Isls.: Ishigaki-jima Is.: 1 ex. (KMNH), Nagura, 24°24.482′N, 124°09.616′E; 18−XII−2005, Y. MINOSHIMA leg.; 1 ex., ditto but 24°24.415′N, 124°09.755′E; 20−XII−2005. Iriomote-jima Is.: 1 ex. (EUMJ), Funaura, 26–IV−1994, M. KAWANABE leg.; 1 ex. (KMNH), Shirahama, 23–IX−1998, T. SHIMADA leg.; 25 exs. (KMNH, SSC), 16 to 20–IV−2005, S. SAKURAI leg. PHILIPPINES: 1 ex. (EUMJ), "Mt.

Makiling/Luzon, Baker" "Paracymus/orientalis/d'Orch/Det. DPWooldridge".

Diagnosis. See below key.

Remarks. This species has been identified as *P. evanescence* by the Japanese authors (e.g., NAKANE, 1963, 1970; SATÔ, 1985 a, b; SASAKI *et al.*, 2002; SATÔ & YOSHITOMI, 2005). On the other hand, WOOLDRIDGE (1977) mentioned the occurence of *P. orientalis* in Japan and endemic of *P. evanescence* in Ceylon. I compared the Japanese specimens with a Philippine specimen identified by WOOLDRIDGE and the descriptions of WOOLDRIDGE (1975, 1977). As the result, the Japanese specimens were identified as *P. orientalis.*

In this study, I considered that *Paracymus evanescens satsumanus* is a junior synonym of *P. orientalis* based on a comparison of the characters of *P. orientalis* specimens with the original description of the subspecies (MATSUI, 1986). Although I did not examine any type materials of the subspecies, the original description of the subspecies provided me with the sufficient information to synonymise the taxon. (1) MATSUI (1986) also recorded *P. evanescens* from Ishigaki-jima Island, hence he identified *Paracymus* from the Nansei Islands (*P. orientalis*) as '*P. evanescens*'. (2) The original description mentioned that the external morphology, including the male genitalia, of *P. evanescens satsumanus* was quite similar to that of the nominotypical subspecies, i.e., *P. orientalis.* Therefore, the subspecies should belong to *P. orientalis*, if it is valid subspecies. (3) The subspecies *satsumanus* is characterised by its slightly shorter sutural stria than those of the nominotypical subspecies; however, this character state is too weak to delimit subspecies. Consequently, I conclude that *P. evanescens satsumanus* should be a junior synonym of *P. orientalis.*

Distribution. *Paracymus orientalis* is distributed in the Oriental and the Palaearctic Regions (Japan) (HANSEN, 1999); in Japan, it is from Honshu (WOOLDRIDGE, 1977), Shikoku, Kyushu and the Nansei Islands.

Key to the Species of the Genus *Paracymus* from Japan

1. Ground punctation of pronotum and elytra coarse (Fig. 1A). Longitudinal lamina connecting mesoventral projection and between mesocoxae (Fig. 1C–D, arrow) strongly carinate, ridge of the carina nearly straight, curving upwards at apex of the projection, thus reaching to apex of the projection (Fig. 1D). Paramere pointed apically; corona located at apex of median lobe (Fig. 2A). ……*P. aeneus* (GERMAR, 1824)

— Ground punctation of pronotum and elytra somewhat fine (Fig. 1B). Longitudinal lamina connecting mesoventral projection and between mesocoxae (Fig. 1E–F, arrow) weakly carinate, ridge of the carina only partly present, thus not reaching to apex of the projection (Fig. 1F). Paramere rounded apically; corona located at apical third of median lobe (Fig. 2B).
…… *P. orientalis* ORCHYMONT, 1925

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要　　約

蓑島悠介：チビマルガムシ属日本産種の正体（鞘翅目ガムシ科）．── 日本産チビマルガムシ属 *Paracymus* はチビマルガムシ *Paracymus orientalis* ORCHYMONT, 1925 とサツマチビマルガムシ *P. evanescens satsumanus* MATSUI, 1986 の2種が知られている．チビマルガムシは東洋区と旧北区（日本）に分布し，日本では本州・四国・九州・南西諸島の池沼に生息する．チビマルガムシとされている日本産種を *P. orientalis* とするのは東洋区のチビマルガムシ属の再検討を行った WOOLDRIDGE (1977) に基づくものであり，この分類学的措置は HANSEN (1999) など，後のカタログでも採用されている．しかし，日本国内では，これまで多くの報告で，チビマルガムシに対して WOOLDRIDGE (1977) でスリランカの固有種とされた *P. evanescens* SHARP, 1890 の学名が与えられてきた．この間 MATSUI (1986) は，これに基づいた同定で，鹿児島県の個体の亜会合線がわずかに短いとして，亜種サツマチビマルガムシ *P. evanescens satsumanus* を記載した．これらの事情から，現在でもチビマルガムシの和名のもと，*P. evanescens* と *P. orientalis* の学名が混在しているほか，サツマチビマルガムシの種の所属も明らかではない．加えて，岡山県の錦海塩田跡地から採集された標本が日本未記録種であることが明らかになった．このような背景のもと，著者はチビマルガムシ属の日本産種を分類学的に整理した．

研究の結果，日本産チビマルガムシ属はチビマルガムシ *P. orientalis* とエンデンチビマルガムシ（和名新称）*P. aeneus* (GERMAR, 1824) の2種に整理された．サツマチビマルガムシは，原記載論文との比較でチビマルガムシの新参シノニムであると判断された．エンデンチビマルガムシは旧北区に広く分布する種で，ヨーロッパでは塩性湿地を好むことが知られている．日本では今のところ岡山県錦海塩田跡地のみから灯火採集により得られており，ここも同様に塩性湿地が広がる環境である．上記2種は，以下の検索表で同定が可能である．

1. 背面の点刻は荒い（図 1A）．中胸腹板突起と中基節窩間をつなぐ薄板は発達する（図 1C–D，矢印）．薄板の稜線はほぼ直線状だが中胸腹板突起直前で強く上方に曲がり，中胸腹板突起先端部に達する（図 1C–D，矢印）．雄交尾器側片先端は尖り，中央片の corona は先端に位置する（図 2A）．
…… エンデンチビマルガムシ *P. aeneus* (GERMAR, 1824)

— 背面の点刻はやや細かい（図 1B）．中胸腹板突起と中基節窩間をつなぐ薄板は発達しない（図 1E–F，矢印）．薄板の稜線は部分的であり，中胸腹板突起先端部に達しない（図 1E–F，矢印）．雄交尾器側片先端は丸く，中央片の corona は先端3分の1に位置する（図 2B）．
…… チビマルガムシ *P. orientalis* ORCHYMONT, 1925

References

FABRICIUS, J. C., 1792. Entomologia Systematica Emendata et Aucta. Secundum Classes, Ordines, Genera, Species Adjectis Synonimis, Locis, Observationihus, Descriptionibus. Vol. 1, Part 1. XX + 330 pp. Hafniae, Christ. Gottl. Proft.

GERMAR, E. F., 1824. Insectorum Species Novae aut Minus Cognitae, Descriptionibus Illustratae. Vol. 1. Coleoptera. 24+624 pp., 2 pls. Halae, J. C. Hendel et Fil.

GREENWOOD, M. T., & P. J. WOOD, 2003. Effects of seasonal variation in salinity on a population of *Enochrus bicolor* FABRICIUS, 1792 (Coleoptera : Hydrophilidae) and implications for other beetles of conservation interest. *Aquatic Conserv. Mar. Freshw. Ecosyst.*, **13**(1): 21–34.

HADLEY, A., 2010. Combine ZP (ver. 6th June, 2010). Available online at http://www.hadleyweb.pwp.blueyonder.co.uk/.

HANSEN, M., 1991. The hydrophiloid beetles. Phylogeny, classification, and a revision of the genera (Coleoptera: Hydrophiloidea). *Biol. Skr.*, **40**: 1–367.

———— 1999. World Catalogue of Insects 2: Hydrophiloidea (s. str.) (Coleoptera). 416 pp. Amsterdam, Apollo Books.

———— 2004. Family Hydrophilidae. pp. 44–68. *In* LÖBL, I., & A. SMETANA (eds), *Catalogue of Palearctic Coleoptera. Volume 2. Hydrophiloidea – Histeroidea – Staphylinoidea*. Apollo Books, Stenstrup.

KOMAREK, A., 2004. Taxonomic revision of *Anacaena* THOMSON, 1859 I. Afrotropical species (Coleoptera: Hydrophilidae). *Koleopt. Rund.*, **74**: 303–349.

———— & R. G. Beutel, 2007. Phylogenetic analysis of Anacaenini (Coleoptera: Hydrophilidae: Hydrophilinae) based on morphological characters of adults. *Sys. Ent.*, **32**(2): 205–226.

Lawrence, J. F., A. Ślipiński, A. E. Seago, M. K. Thayer, A. F. Newton & A. E. Marvaldi, 2011. Phylogeny of the Coleoptera based on morphological characters of adults and larvae. *Ann. Zool.*, **61**(1): 1–217.

Matsui, E., 1986. Notes on some new Hydrophiloidea from Japan (Coleoptera). *Papers on Entomology presented to Prof. Takehiko Nakane in Commemoration of his Retirement*. pp. 81–90. Japanese Society of Coleopterology, Tokyo.

Minoshima, Y., 2009. First record of the hygropetric genus *Oocyclus* Sharp (Coleoptera: Hydrophilidae) from Laos, with description of a new species. *Zootaxa*, (2192): 45–55.

Nakane, T., 1963. Hydrophilidae. pp. 63–66, pl. 32–33. *In* Nakane, T., K. Ohbayashi, S. Nomura & Y. Kurosawa (eds.), *Iconographia Insectorum Japonicorum Colore Naturali Edita*, *Vol. 2 (Coleoptera)*. Hokuryukan, Tokyo. (In Japanese with English (Latin) title.)

———— 1970. [A check list of Hydrophiloidea of Japan (Coleoptera)]. *Nature and Insects*, *Tokyo*, **5**(5): 25–29. (In Japanese.)

Orchymont, A., d', 1925. Hydrophilides des Iles Philippines. *Bull. Ann. Soc. ent. Belge*, **65**: 200–202.

Ruta, R., M. Stachowiak & O. Aleksandrowicz, 2006. The first record of *Paracymus aeneus* (Germar, 1824) (Coleoptera: Hydrophilidae) in Poland with notes on halophilous and halobiontic Hydrophilidae and Hydraenidae in Polish fauna. *Pol. Pismo. Ent.*, **75**(3): 359–368.

Sasaki, T., M. Kimura & F. Kawamura, 2002. Coleoptera. pp. 157–284. *In* Azuma, S., M. Yafuso, M. Kinjo, M. Hayashi, T. Kohama, T. Sasaki, M. Kimura & F. Kawamura (eds.), *Check List of the Insect of the Ryukyu Islands. Second Edition*. The Biological Society of Okinawa, Nishihara-chô, Okinawa.

Satô, M., 1985 a. Hydrophilidae. pp. 209–216, pls. 38–39. *In* Uéno, S.-I., Y. Kurosawa & M. Satô (eds.), *The Coleoptera of Japan in Color Vol. II.* Hoikusha Publishing Co., Ltd., Osaka. (In Japanese with English title.)

———— 1985 b. Coleoptera. pp. 227–260. *In* Kawai, T. (ed.), *An Illustrated Book of Aquatic Insects of Japan*. Tokai University Press, Tokyo. (In Japanese with English title.)

———— & S. Saito, 1989. Hydrophilidae. pp. 242–246. *In* Entomological Laboratory, Faculty of Agriculture, Kyushu University, & Japan Wild Life Research Center (eds.), *A Check List of Japanese Insects*. Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka. (In Japanese with English title.)

———— & H. Yoshitomi, 2005. Coleoptera. pp. 591–658. *In* Kawai, T., & K. Tanida (eds.), *Aquatic Insects of Japan*: *Manual with Keys and Illustration*. Tokai University Press, Hadano, Kanagawa. (In Japanese with English title.)

Sharp, D., 1890. On some aquatic Coleoptera from Ceylon. *Trans. ent. Soc., London*, **1890**: 339–359.

Short, A. E. Z., & M. Fikáček, 2011. World catalogue of the Hydrophiloidea (Coleoptera): additions and corrections II (2006–2010). *Acta ent. Mus. Nat. Pragae*, **51**(1): 83–122.

———— & ————, 2013. Molecular phylogeny, evolution and classification of the Hydrophilidae (Coleoptera). *Sys. Ent.*, **38**(4): 723–752.

Wood, P., M. Greenwood & M. Agnew, 2003. Pond biodiversity and habitat loss in the UK. *Area*, **35**(2): 206–216.

Wooldridge, D. P., 1975. A lectotype, redescription and new status for *Paracymus evanescens orientalis* d'Orchymont (Coleoptera: Hydrophilidae). *J. Kans. ent. Soc.*, **48**(1): 18–21.

———— 1977. *Paracymus* of the Oriental Faunal Region (Coleoptera: Hydrophilidae). *Ibid.*, **50**(1): 119–128.

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