STUDIES ON THE FAUNA OF SURINAME
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WATER-STRIDERS OF THE AMERICAN GENUS TROCHOPUS

(Hemiptera: Veliidae)

by

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In April 1898 the veliid genus *Trochopus* Carpenter was erected to hold a new halophilous water-strider from Jamaica, described as *marinus*. The specimens were netted in numbers on standing salt waters beneath mangrove trees in swamps near the head of Kingston Harbour. In August of the same year CHAMPION described the second member of the genus, *Trochopus salinus*, collected in the mangrove swamps of the Pearl Islands, Gulf of Panama. Subsequently, KIRKALDY (1900) wrongly considered the genus *Trochopus* to be a synonym of *Rhagovelia* Mayr (1865), but correctly treated the trivial name *marinus* as a synonym of *Rhagovelia plumbea* Uhler. This generic synonymy was largely accepted until CHINA & USINGER (1949) took *Trochopus* out of synonymy and restored it to its original status. As the trivial synonymy is correct, this makes the genotype *Trochopus plumbeus* (Uhler) (= *marinus* Carpenter). Recently BACON (1956) and also MATSUDA (1956) followed KIRKALDY and wrongly repudiated *Trochopus* as a synonym of the older genus *Rhagovelia*, including the transfer of *plumbeus* and *salinus* back into the latter genus.

Dr. CARL J. DRAKE died on October 2nd, 1965, only a few weeks before the proofs of the present paper were received by the junior author, who deeply regrets the death of this outstanding hemipterologist.

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In the present paper, the authors are in full concurrence with the classification of CHAMPION and of CHINA & USINGER, in which *Trochopus* is restored to its original status. As here systematized, *Trochopus* comprises *T. plumbeus*, *T. salinus*, and the new species described below from Surinam.

In the structural measurements 80 microunits equal 1 mm. The fine illustrations were executed by Miss LISA BIGANZOLI, Washington, D.C.

The genera *Trochopus* and *Rhagovelia* share a singular feature unknown in any other veliid genus or even in other families of water-striders. The terminal segment of each leg of the middle pair (♂ and ♀ alike) is split lengthwise apically for about three-fourths of its length (Fig. 99–100). Arising from a common stem at the base in the interior of each cleft, there are several long, branched, ciliated hairs doubled up together, which, at will, can be spread out fanwise in the form of a sector of a circle and then, when not in use, folded back again inside of the cleft. This remarkable structure functions as a propelling device in navigation on surface film. Excellent figures of this singular structure have been published by CARPENTER (1898), TORRE-BUENO (1916), GOULD (1931) *et al.* The two veliid genera possessing this feature are dichotomized here:

Genus *Rhagovelia* Mayr. – Pterygopolymorphic, gregarious, fluvicoline, inhabits surface film of fresh water streams, especially in those parts rippled in running over rough shallows. – Tarsal formula: 3-segmented in all legs. – Inhabits rivers, creeks, and brooks in all continents and many islands. – Many species.

Genus *Trochopus* Carpenter. – Monomorphic, apterous, gregarious, thalassophilous, inhabits the surface film of salt, saline or brackish waters, especially those relatively smooth or standing. – Tarsal formula: 3, 2, 2. – Found in brackish streams and sheltered waters along the coast of many islands of the West Indies, the continental shores abutting the Gulf of Mexico and Caribbean Sea of the Atlantic Ocean; on the opposite side of the Isthmus, Panama Bay of the Pacific Ocean. – Three species only.

Genus **Trochopus** Carpenter

Trochopus CARPENTER 1898 (April), p. 78. — CHAMPION 1898 (August), p. 140. — TORRE-BUENO 1916, p. 56; 1923, p. 418 (as subgenus). — CHINA & USINGER 1949, p. 351 (in key to genera of Veliidae).

The members of this genus are small, constantly apterous, gregarious, maricolous, and inhabit relatively still salt and brackish waters of bays, atolls, estuaries, inlets, and various other recessions in the coastlines of islands of the West Indies, offshore islands of the continental shelf and habitable indentations of the coastal mainlands abutting the Gulf of Mexico and Caribbean Sea. The tidal setting-in of salt water from the sea makes fresh water streams brackish as far upstream as the flow tides ascend. Schools of *Trochopus* thrive in favourable abodes on such waters. The new species described below was found in quite large numbers at the mouth of Suriname River and on Caroline Creek, an upstream tributary. The latter record extended the coastal range of the genus eastward beyond the Caribbean Sea into the Atlantic Ocean. On the Pacific side of the Isthmus of Panama, another member of *Trochopus* inhabits mangrove marshes and saline waters at the mouths of streams emptying themselves into Panama Bay.

Even though salt-demanding, both nymphs and adults tolerate a wide range of salinity, virtually from fresh to extremely salty waters. Of the salt-water habitats, the placid waters of mangrove marshes, lagoons inside coral reefs, and sheltered coves in slighty saline water near the mouth of streams rank high among the preferred breeding places. Although possessing nautical skill and being venturesome, the species apparently never wander far out on the open sea. Like other water-striders, all are predaceous.

TRICHOTOMOUS KEY TO SPECIES OF *Trochopus* (♂ & ♀)

1. Pronotum deeply concavely excavated at middle of hind margin (Fig. 99, 100a); basal segment of each antenna and femur of each leg with a prominent, longitudinal, black stripe (Fig. 99, 100); front coxae unarmed; hind femur of male beneath armed with a

long row of spines extending about three-fourths of its length (Fig. 101d); hind femur of female beneath armed with a short row of 4–7 small spines beyond the middle; ♂ paramere (Fig. 100b) and ♀ ovipositor (Fig. 101g) as in illustrations . . . . . *T. ephydros*, n. sp.

2. Pronotum with hind margin almost truncate (Fig. 101j); basal segments of antennae and femora of all legs without stripes; trochanter (Fig. 101b) of front legs of male each with a long, thick, blunt, tubercular spine on inferior side; legs (Figs. 101b–c) moderately clothed with long, black hairs; hind femur (Fig. 101c) of male armed beneath with a long row of prominent spines, the two spines nearest middle longer than others; male paramere (Fig. 100d) and tip of female ovipositor (Fig. 101f) as in illustrations . . . . . *T. salinus*

3. Pronotum bisinuately excavated at middle of hind margin (Fig. 101i); legs without long hairs; front coxae in both sexes unarmed; hind femur of male beneath armed with 3–5 spines beyond the middle; femora of female unarmed; male paramere (Fig. 100c) and tip of female ovipositor (Fig. 101h) as in illustrations . . . . . *T. plumbeus*

Trochopus plumbeus (Uhler)

Fig. 100c; 101a, h–i

Rhagovelia plumbea Uhler 1894, p. 217. — Lethierry & Severin 1896, p. 55. — Kirkaldy 1900, p. 72; 1901, p. 309. — Kirkaldy & Torre-Bueno 1909, p. 206. — Banks 1910, p. 28. — Barber 1914, p. 499. — Van Duzee 1916, p. 49; 1917, p. 435. — Hungerford 1920, p. 130. — Blatchley 1926, p. 999. — Gould 1931, p. 39. — Drake & Harris 1931, p. 35; 1935, p. 35. — Bacon 1956, p. 733. — Matsuda 1956, p. 931.
Trochopus marinus Carpenter 1898, p. 79, pl. 13.
Taochopus [*sic*] *plumbeus:* Kirkaldy 1900, p. 72.
Rhagovelia (*Trochopus*) *plumbeus:* Torre-Bueno 1916, p. 56; 1923, p. 418.
Trachopus [*sic*] *marinus:* Van Duzee 1917, p. 436.
Rhagovelia salina (not Champion): Gould 1931, p. 41.
Trochopus maritimus (*sic*): Drake & Harris 1935, p. 35.
Trochopus plumbea: Cobben 1960, p. 16.

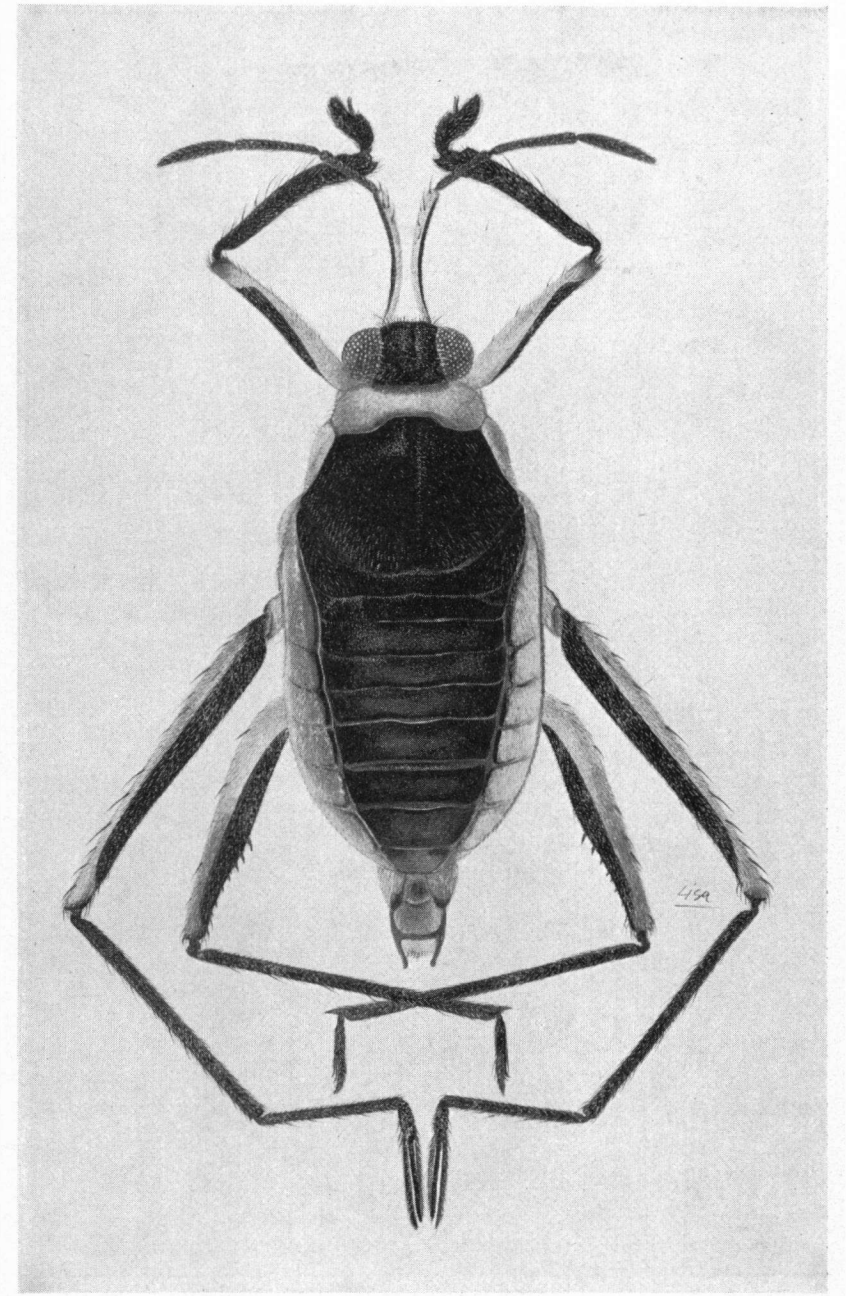

Fig. 99. *Trochopus ephydros* n. sp., ♀ allotype, from Suriname.

Apterous form. Small, color very variable, especially markings. Bluish black with grayish and golden pubescence; pronotum with median longitudinal part yellowish or orange; connexiva very variable in color, bluish black, yellowish, or golden, occasionally whitish; body beneath grayish brown to orange. Antenna with basal third to half of first segment yellowish. Legs with coxae, trochanters, and narrow basal part of front and hind femora yellowish or golden.

Length ♂ 2.38 mm, ♀ 3.45 mm; width ♂ 1.00 mm, ♀ 1.50 mm.

Small, pronotum bisinuately excavated behind (Fig. 101i), trochanters in both sexes unarmed, connexiva obliquely or completely reflexed. Hind femur of male with three to five spines on inferior side behind the middle; hind femur of female unarmed. Male paramere as in Fig. 100c; female ovipositor as in Fig. 101h.

Distribution. U.S.A. (southern coast of Florida), Mexico (Isla Majures), Honduras, Venezuela (La Guaira); Bahamas, Cuba, Jamaica, Cayman Islands, Hispaniola, Puerto Rico, Virgin Islands, St. Lucia, St. Vincent, Grenada, Trinidad, Bonaire, Curaçao, Aruba.

This is the smallest, most variable in color, and the most widely dispersed member of the genus. — In the illustrations, the structural parts were made from specimens collected in the Bahamas and on the southern coast of Florida.

Trochopus ephydros, n. sp.

Fig. 99; 100a–b; 101d–e, g, k

Apterous form. Moderately large, blackish, slightly bluish pruinose, clothed with short grayish pubescence. Head blackish, with impressed median longitudinal line; antennae brownish black; each basal segment yellowish brown with a prominent longitudinal, black stripe on outer side; rostrum yellowish with black apex. Pronotum brownish with median part yellowish to pale brown; mesonotum brownish black, lightly coated with bluish pruinose. Abdomen above blackish, beneath varying from whitish to black; prosternum also varies much in color, often blackish. Legs brownish black, all coxae and trochanters yellowish to dark brown; femora

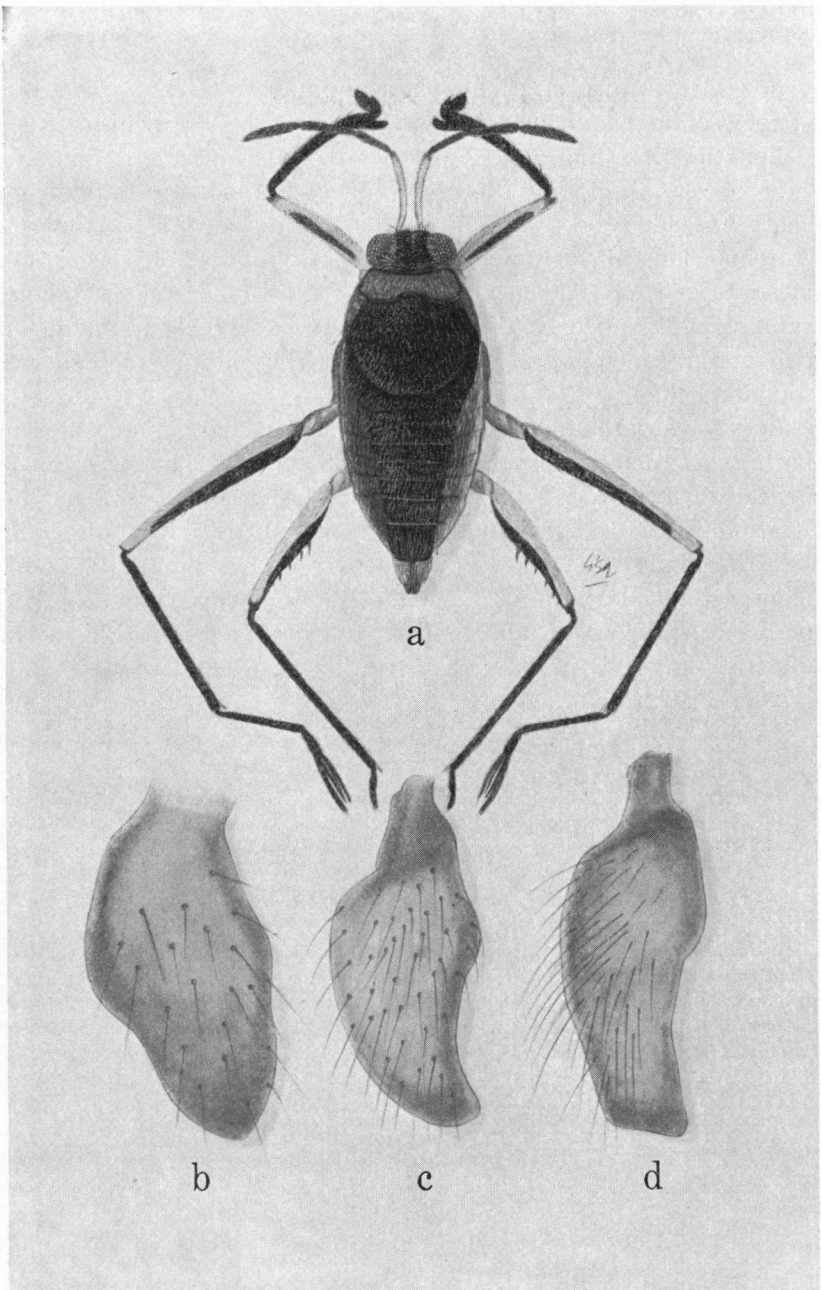

Fig. 100a–b. *Trochopus ephydros* n. sp., ♂ holotype, from Suriname. — a. Type specimen. b. right paramere.
Fig. 100c. *Trochopus plumbeus* (Uhler). — ♂, right paramere.
Fig. 100d. *Trochopus salinus* Champion. — ♂, right paramere.

yellowish or brownish, each with a prominent, black, longitudinal stripe. Connexiva above and beneath yellowish to brownish.

Length ♂ 2.00 mm, ♀ 3.20 mm; width ♂ 0.85 mm, ♀ 1.48 mm.

Head very short, only slightly produced in front of eyes; rostrum short, extending backwards in repose slightly beyond prosternum. Antennae long, slender, measurements: (♂) I, 45; II, 18; III, 28; IV, 30 and (♀) I, 66; II, 34; III, 43; IV, 40. Pronotum very short, subrectangular, deeply widely concavely excavated at middle of rear margin; mesonotum very large, covering most of metanotum, rounded behind.

Legs long, without long hairs, the front trochanters unarmed in both sexes; femora only slightly swollen; hind femora of male beneath armed with a fairly long row of spines as shown in illustration (Fig. 101d), the first spine situated a little in front of middle and then followed by 7–9 spines slowly decreasing in size; hind femur of female with 4–5 smaller spines beyond middle. Male paramere (Fig. 100b) and female ovipositor (Fig. 101g) as in illustrations.

Holotype ♂ and allotype ♀, both apterous, SURINAME, Carolina Creek, an upstream tributary of the Suriname Rivier, 19.XI.1962, Dr. Borys Malkin (Drake Coll. USNM).
Paratypes 10 specimens taken at same time as holotype, and 8 specimens plus numerous nymphs and teneral adults near the mouth of the Suriname Rivier, 3.V.1963, by the junior author, in his collection and in Drake Coll.
Although primarily salt-loving, the specimens from Carolina Creek were rather removed far from brackish waters.

In size and general aspect, this species resembles more *Trochopus salinus* than *T. plumbeus*. It differs, however, from either of them by the color of basal segments of antennae and femora of all legs, concavely excavated hind margin of pronotum, and shapes of male parameres and female ovipositor. These and other characters are employed in the key to species.

Trochopus salinus Champion

Fig. 100d; 101b, c, f, j

Trochopus salinus CHAMPION 1898, p. 140, pl. 9 figs. 4–5.
Rhagovelia salina: KIRKALDY 1901, p. 310. — BACON 1956, p. 736, pl. 3 fig. 14. — MATSUDA 1956, p. 931.

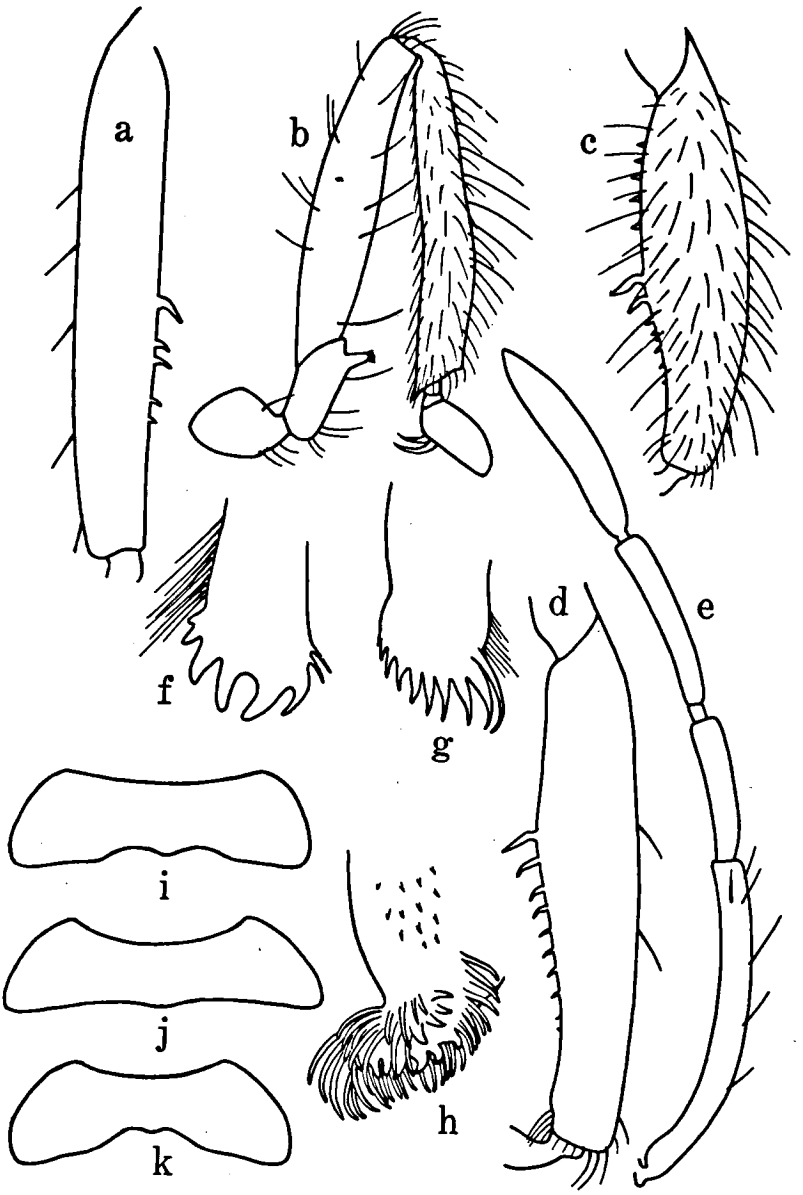

Fig. 101a, h–i. *Trochopus plumbeus* (Uhler). — a. ♂, right hind femur. h. ♀, left ovipositor. i. ♀, pronotum.
Fig. 101b–c, f, j. *Trochopus salinus* Champion. — b. ♂, right foreleg. c. ♂, left femur. f. ♀, left ovipositor. j. ♂, pronotum.
Fig. 101d–e, g, k. *Trochopus ephydros* n.sp. — d. ♂, left hind femur. e. ♀, left antenna. g. ♀, left ovipositor. k. ♀, pronotum.

Apterous form. Subfusiform (♂) or obovate (♀), brownish black to black, slightly bluish pruinose, feebly mottled with grayish, beneath mostly grayish; connexiva above and beneath ferrugineous. Antenna brownish black with base of first segment yellowish to reddish brown. Legs brownish black with most of basal half of front and hind pairs and narrow base of intermediate pair yellowish to reddish brown; coxae and trochanters yellowish to brownish. Median part of pronotum yellowish brown. Male smaller than female.

Length ♂ 3.25–3.40 mm, ♀ 3.70–3.85 mm; width ♂ 1.30 mm, ♀ 1.75 mm.

Male. Antenna long, slender, measurements: segment I, 80; II, 42; III, 50; IV, 50. Pronotum very short, almost truncate on hind margin. Anterior trochanters each armed with a long, thick, tubercular-like spine on lower side with tip thickly setose (Fig. 101b); each hind femur beneath armed with a long row of spines, the two spines near the middle longer and bent outward (Fig. 101c). Male paramere (Fig. 100d) as figured.

Female. Trochanters of forelegs unarmed. Hind femur beneath with 3–4 short spines. Antennal measurements: segment I, 85; II, 42; III, 52; IV, 50. Ovipositor (Fig. 101f) as in illustration. Pronotum with hind margin as in male.

Holotype ♂ and allotype ♀, both apterous, PANAMA, San Miguel, Pearl Islands, Gulf of Panama, Pacific Ocean, G. C. Champion. Registered number British Museum 1901–275. Many paratypes, taken with the type, also in British Museum (Natural History).

Distribution. Panama: Pearl Islands, Isle Miguel (type series), and Old Panama (about 100 specimens netted in a little cove in a small creek, 300 feet from the Panama Bay, C. J. Drake).

Readily distinguished by structures according to key and figures. — The illustrations were made from specimens taken in Old Panama City.

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