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CORTICOLOUS MITES; NEW AND UNRECORDED SPECIES 
OF THE GENUS TYDEUS (ACARI: PROSTIGMATA: TYDEIDAE) 
AND A KEY TO SPECIES OF SOUTHERN SWEDEN 

by Faten MOMEN * and Lars LUNDQVIST **

SUMMARY: Four species of the genus Tydeus are described and illustrated as new to science. T. ivoensis n.sp. and T. filiformis n.sp. were collected from moss layer on the soil surface; T. paravarsoviensis n.sp. and T. penicillatus n.sp. from lichens on twigs found on the soil surface. Paralorryia insignia Livshitz, 1973, P. carya Baker, 1968, Lorryia funki Baker, 1968 and L. polygonata Kulczycki, 1992 are all transferred to the genus Tydeus on the grounds of leg chaetotaxy. The female of T. funki is redescribed, based on the holotype, and a male, collected from Sweden, is described for the first time. The female of T. carya is described for the first time. Eight species are reported as new to Sweden. A key to adults of the twenty-four Tydeus species so far known in Southern Sweden is given.

INTRODUCTION

The foraging habits of these small mites, ranging from 150 μm to 400 μm, are most often unknown (ANDRÉ 1986).

In a previous report on tydeid mites in southern Sweden (MOMEN & LUNDQVIST 1995), six species of the genus Tydeus were described as new to science. Here we describe another four and present a key to all twenty-four species that are so far known to Sweden.
METHODS

The mites were extracted with Berlese funnels and mounted individually on microscopic slides in a gum-chloral hydrate medium. Measurements are given either as minimum-maximum lengths, or as means based on 2-8 individuals.

We follow the generic concept of ANDRÉ (1980, 1981 a, b), although we are aware of the criticism that his work has met due to incongruity with the Code of Zoological Nomenclature (KAZMIERSKI 1989). The reason for us to do so is this: we are of the opinion that the family Tydeidae is in need of a total revision, based on sound cladistic methods. Until such a revision is carried out we think it is better to retain one, though defective, system. This is preferable to trying to mend the system in small steps, which may add even more confusion to the present situation.

Holotypes are deposited in the collection of the Zoological Museum, Lund University [ZML]. Paratypes, when at hand, are deposited at the Natural History Museum, London [BMNH], and the National Research Centre Plant Protection Department, Cairo, Egypt [NRCE]. The distribution of paratypes between collections is listed for each new species. The slide number of the type-series is engraved with a diamond on each slide.

LOCALITIES

Mites were collected from the following localities:

1. Alnarå, Agricultural University, 6 km N Malmö (N 55° 32'; E 13° 04').
2. Dörröd, 5 km WSW Genarp (N 55° 35'; E 13° 29'). Old hollow trees, Salix fragilis, along the road
3. Ivöklock, Ivå, 20 km NE Kristianstad (N 56° 08'; E 14° 24'). Old, abandoned limestone quarry. Calcereous, but water permeable, dry soil.
4. Lahbibagrottan, Kullaberg, 13 km N Högånäs (N 56° 18'; E 12° 27'). Sparse vegetation of Pinus sp., Prunus spinosa, Quercus robur, and Euonymus europaea on the stony south-facing slope of a cliff that juts out into the Kattegat sea.
5. Linnebjer, 7 km ENE Lund (N 55° 44'; E 13° 18'). Mixed forest, bushes (Corylus avellana, Crataegus oxyacantha) and tall deciduous trees (Betula pubescens, Quercus robur, Sorbus aucuparia, Tilia cordata).
6. Norrekås, 1.5 km S Skillinge (N 55° 28'; E 14° 17'). Planted coniferous (Pinus sp.) forest of moderate height, 10-15 m, close to the sea-shore. Bushes of Populus tremula, Rosa sp., Sambucus nigra, S. race-mosa, Sorbus aucuparia, S. intermedia.
7. Prästtorpåsjön, 7 km N Häör (N 55° 59'; E 13° 34'). Deciduous forest. Tall trees of Quercus robur and Fagus sylvatica.
8. Stensoffa, 16 km E Lund (N 55° 42'; E 13° 26'). Mixed forest, bushes and trees of moderate height, Acer platanoides, Tilia cordata, Fagus sylvatica, Betula pubescens, Quercus robur.
9. Södra Årde, 11 km E Växjö (N 56° 54'; E 14° 59'). Dense coniferous forest of Picea abies mixed with single deciduous trees of Fagus sylvatica and Sorbus aucuparia. Thick moss layer.
10. Vomb, 23 km E Lund (N 55° 41'; E 13° 33'). Coniferous forest, with Pinus silvatica of moderate height. Sparse ground vegetation of grasses, with many lichens (Cladonia sp.).

SUBFAMILY TYDEINAE

Genus Tydeus Koch, 1835, sensu André, 1980

Type species: Tydeus kochi Oudemans, 1928, by subsequent designation of Baker and Wharton, 1952.

André (1980) defined his new genus Orthotydeus in such a way that it included T. kochi and treated the name Tydeus as a junior synonym to the new genus. Kazmierski (1989) suggested the following synonymies:


However, there may be other, perhaps simpler, ways to handle the problem with the identification of the three genera and their type species, e.g. giving them sub-generic rank in the genus Tydeus Koch, 1835. For the time being, with the motivation given
under METHODS, we use the name Tydeus as ANDRÉ (1980) suggested.

The genus Tydeus is characterised by: Prodorsum recurved. Opisthosoma: dorsal chaetotaxy: 10 ($l_2$ and $h_1$ missing); porodotaxy: 3; genital organotaxy (0.4-6-4), anterior egenufl flap of males (when known) with three pairs of setae, posterior egenufl flap with a single pair of setae; epimeral formulae: (3:1-4-2); leg setal patterns: I $G_{\text{key to adults of the genus Tydeus in Southern Sweden}}$

**Glossary:**

**Reticulation:** the striation forms cells (Fig. 1) that are connected to each other by cross-ties (Fig. 7).

**Reticulated area:** distinct sector with reticulation surrounded by non-cell forming striation (Fig. 48).

**Reticulated elements:** single cells or loose units of few cells (Fig. 19).

1. Dorsum completely reticulated or divided into 6-20 discrete sections........................................ 2

2. Dorsum divided into discrete sections........................................ 7

3. Trichobothrium flagellate, smooth; dorsal body setae either 1) broadly expanded and smooth or 2) blunt distally, ornamented or sparsely serrated...... 4

4. Dorsal body setae broadly expanded, smooth ............ T. parainflatus Momen & Lundqvist, 1995

5. Dorsal body setae ornamented; palp tarsus shorter than moveable digit of chelicera; terminal eupathidium on palp thick............. T. hughesae Momen & Sinha, 1991

6. Dorsal body setae long (25-33 Qm); terminal eupathidium on palp bidentate; setae $k$ on tibia I divided .......... T. reticulata Oudemans, 1928

7. Reticulated pattern of dorsum divided into 6, 9, 13 or 28 sections; most dorsal body setae lanceolate, smooth or serrate and curved............. 8

8. Trichobothrium rodlike; dorsal setae $h_2$ blunt and expanded distally; reticulate pattern of dorsum divided into 6 sections ....... T. reticulata Oudemans, 1928

9. Dorsum with 9 reticulated sections, dorsal body setae smooth .................. T. catemulata (Thor), 1931

10. Dorsum with 13 or 28 reticulated sections, dorsal body setae serrate.......... 10

11. Dorsum with 13 reticulated sections; moveable digit of chelicera 2 times longer than palp tarsus .......... T. funki (Kulczycki), 1992

12. Without reticulated area on anterior part of prodorsum........................................ 13

13. Striation between setae $d_2$ longitudinal ............ 14

14. Striation between setae $d_3$ transverse ............ 16

15. Setae $p_1$ and $p_2$ simple, smooth; terminal eupathidium on palp bidentate; palp tarsus as long as moveable digit of chelicera ............ T. penicillatus n.sp.


17. Dorsal setae $d_4$, $d_5$, $l_4$, and $l_5$ long (26-30 Qm);
moveable digit of chelicera shorter than palptarsus.  
— dorsal setae $d_1$, $d_2$, $l_4$, and $l_5$ short (14-17 µm); moveable digit of chelicera longer than palptarsus.  

18. Distinct reticulated area on anterior part of prodorsum.  
— at most a few reticulated elements on anterior part of prodorsum.  

19. Dorsal body setae lanceolate, strongly serrate, curved; terminal eupathidium on palp thick, elongate.  
— dorsal body setae 1) aciculate and smooth or 2) simple, faintly serrate; terminal eupathidium on palp bidentate.  

20. Dorsal body setae pointed distally.  
— dorsal body setae blunt distally.  

21. Dorsal body setae aciculate, nude; seta $d$ on palp forked.  
— dorsal body setae simple, faintly serrate; seta $d$ on palp simple.  

22. Dorsal body setae strong and serrate.  
— dorsal body setae aciculate, nude.  

23. Striae with round lobes; moveable digit of chelicera relatively short; terminal eupathidium on palp bidentate, seta $d$ divided.  
— striae with transverse lobes; moveable digit of chelicera long; terminal eupathidium on palp thick, elongate, seta $d$ simple.  

Tydeus iwoensis n.sp.  
(Figs 1-9)

ADULT FEMALE (Fig. 1). Dorsum 375-388 µm; width 273-285 µm, completely reticulated, without distinct areas except a small area around seta $p_3$; mesh of reticulation irregular, lines with I and Y-shaped cross-ties (Fig. 7). Dorsal setae strong, blunt distally, smooth, with delicate ornamentation, which is visible only under high magnification (1000 ×); trichobothrium simple and filiform; seta $h_2$ situated ventrally.  

Setal measurements: $p_1$ and $p_2$ subequal 22 µm; $p_3$, $d_1$ and $d_2$ subequal 26 µm; $s$ 80 µm; $d_3$ $d_4$ and $d_5$ subequal 29 µm; $l_1$ 26 µm; $l_4$ 30 µm; $l_5$ 27 µm; $h_2$ 19 µm; $ps$ 16 µm.  

Ventrally striation replaces reticulation; posterior of venter reticulated to setae $ps$.  
All legs possess two claws and an empodial hook (Figs 2-5). Solenidion on tarsus I slender and long (9 µm). Solenidion on tarsus II short (4 µm). Seta $k$ on tibia I forked (Figs 2-3). Individual variability of leg chaetotaxy has been recorded in this species (Momen & Lundqvist 1993).  

Gnathosoma completely covered dorsally by anterior projection of prodorsum. Setal pattern of palpus 6(1)-2-2; terminal eupathidium thick, seta $d$ divided; solenidion on palp long (4 µm) (Fig. 6). Moveable digit of chelicera (15 µm) longer than palptarsus (10 µm).  

Aggential and genital setae setiform (Fig. 9).  

ADULT MALE. Similar to female except genital area. Setae on eugenital flaps feathered (Fig. 8).  

TYPE DATA. Holotype, female, slide no. 5520, October 29, 1991. Allotype, male, slide no.5777, May 20, 1992, 3 females paratypes, October 29, 1991, 9 females and 1 male paratypes, May 20, 1992: Ivöklack, Ivö (Loc. 3); ex moss on soil surface, leg. Lundqvist. Distribution of paratypes: 5 females, 1 male [ZML], 3 females, 1 male [BMNH], 4 females [NRCE].  

ETYMOLOGY. The species name is derived from the type locality.  

REMARKS. Tydeus iwoensis n.sp. is distinct in having strong, ornamented dorsal setae, reticula irregular in shape and short palptarsus with long solenidion. This combination of characters separates the species from all congeners.

Tydeus paravarsoviensis n.sp.  
(Figs 10-18)

ADULT FEMALE (Fig. 10). Length of body 294-305 µm; width 195-206 µm. Dorsum with three rosette-like areas marking muscle attachments between setae $d_1$ and $d_2$, $d_2$ and $d_3$. Dorsum completely reticulated; lines of dorsal reticulation with Y, I and X-shaped cross-ties (Fig. 16). Dorsal setae strong, blunt and sparsely serrate, except trichobothrium which is filiform and smooth.
FIG. 1-9: *Tydeus ivoensis* n.sp.
7. — Adult female, reticulation pattern on dorsum. 8. — Adult male, genital region. 9. — Adult female, genital region.

FIG. 10: *Tydeus paravarsoviensis* n.sp. Dorsal view. Adult female
Setal measurements: $p_1$ and $p_3$ subequal 22 $\mu$m; $p_2$ 20 $\mu$m; $s$ 63 $\mu$m; $dl-d_5$ and $l_1-l_5$ subequal 20 $\mu$m; $h_2$ and $ps$ subequal 15 $\mu$m.

Ventrally striation replaces reticulation.

Each apotele with two claws and an empodium. Empodia without claws (Figs 11-14). Solenidion on tarsus I slender, long (7 $\mu$m). Seta $k$ on tibia I forked (Fig. 11).

Setal pattern of palpus: 6(1)-2-2; terminal eupathidium bidentate distally, whereas seta $d$ divided and seta $ba$ short and slender (Fig. 15). Moveable digit of chelicera as long as palpatarsus (18 $\mu$m).

Aggenital and genital setae setiform (Fig. 18).

ADULT MALE. Similar to female except genital area (Fig. 17).
Tydeus filiformis n.sp.

(Figs. 19-28)

ADULT FEMALE (Fig. 19). Length of body 345-357 \( \mu m \); width 212-222 \( \mu m \). Dorsum with four pairs of rosette-like areas marking muscle attachments between setae \( d_1 \) and \( d_2 \), \( d_2 \) and \( d_4 \). A few reticulated elements scattered on the anterior portion of the prodorsum. Dorsal body striiae with transverse lobes (Fig. 28). Dorsal body setae strong and serrate except the trichobothrium which is filiform and smooth.

Setal measurements: \( p_1-p_3 \) subequal 29 \( \mu m \); \( s \) 67 \( \mu m \), \( d_1-d_2 \) subequal 27 \( \mu m \); \( d_4 \) and \( d_5 \) subequal 25 \( \mu m \), \( h_2 \) 27 \( \mu m \), \( l_1 \) 26 \( \mu m \); \( l_4 \) 30 \( \mu m \); \( l_5 \) 27 \( \mu m \); \( ps \) 19 \( \mu m \).

All legs terminate in two claws and a hairy empodium with a claw (Figs 20-23). Solenidion on tarsus I long and slender (10 \( \mu m \)), solenidion on tarsus II short (3 \( \mu m \)); seta \( k \) on tibia I strong and simple (Figs 20-21).

Setal pattern of palpus: 6(1)-2-2. Terminal eupathidium thick and elongate; seta \( d \) simple and slender (Fig. 24). Moveable digit of chelicera (Fig. 25) longer (36 \( \mu m \)) than palp tarsus (21 \( \mu m \)).

Aggenital and genital setae setiform (Fig. 26).

ADULT MALE. Similar to female except for the genital area (Fig. 27).

Type data. Holotype, female, slide no. 5660: Vomb (Loc. 10), ex moss on soil surface, collected April 28, 1992, leg. LUNDQVIST; allotype, male, slide no. 5743; 7 females and 6 males paratypes, Kullaberg (Loc. 4), ex bark of tree, Pinus sp., collected May 14, 1992; leg. LUNDQVIST; 3 females, paratypes, Linnebjer (Loc. 5), collected June 9, 1993, ex moss on fallen tree, leg. LUNDQVIST. Distribution of paratypes: 4 females, 3 males [ZML], 3 females, 3 males [BM(NH)], 3 females, 1 male [NRCE].

Etymology. The species name refers to the long trichobothria (filiform Lat. = thread-like).

Remarks. The new species is similar to Paralor­ryia mansoni Baker, 1968b, collected at Pohutakawa, Orera, New Zealand. It can be distinguished by having few reticulated elements on the anterior portion of prodorsum, and by having transverse lobes on striae, as opposed to round lobes in P. mansoni. The species can also be distinguished by the long trichobothrium, which is more than 2 times longer than other dorsal body setae; the trichobothrium in P. mansoni is relatively shorter.

Tydeus penicillatus n.sp.

(Figs. 29-37)

ADULT FEMALE (Fig. 29): Length of body 248-260 \( \mu m \), width 121-127 \( \mu m \). Dorsum of body without reticulate pattern. Dorsal body striiae with round lobes (Fig. 37). Dorsal body setae \( p_1 \) and \( p_2 \) thin and smooth; proximal half of setae \( p_3 \) serrated, other dorsal body setae strongly serrate except the trichobothrium, which is filiform and smooth.
Setal measurements: $p_1$ and $p_2$ subequal 7 μm; $d_1$ and $d_2$ subequal 10 μm; $d_3$ and $d_4$ subequal 12 μm; $d_5$ 17 μm; $h_2$ 15 μm; $l_1$ 11 μm; $l_4$ 14 μm; $l_5$ 16 μm; $ps$ 9 μm; $s$ 38 μm.

Each apotele with two claws and an empodial hook (Figs 30-33). Solenidion on tarsus I slender and relatively short (5 μm); seta $k$ on tibia I divided (Fig. 30).

Setal pattern of palpus: 6(1)-2-2. Terminal eupathidium bidentate distally; seta $d$ simple and seta $ba$ short and slender (Fig. 34). Moveable digit of chelicera as long as palptarsus (11 μm).

**ADULT MALE.** Similar to female except genital area (Fig. 36).
Type data. Holotype, female, slide no. 5626, allotype, male, slide no. 5625; 1 female paratype: Prästtorpasjön (Loc. 7), ex lichens on twigs on soil surface, collected April 14, 1992, leg. LUNDQVIST. Distribution of paratypes: 1 female [ZML].

Etymology. The species is named *penicillatus* (Lat. = like a brush) referring to the shape of setae $p_3$.

Remarks. *Tydeus penicillatus* n.sp. is distinct in having dorsal setae $p_1$ and $p_2$ short, thin and smooth, setae $p_3$ long and proximally serrated, all other dorsal setae robust and strongly serrate. This combination of characters separates the species from all congeners.
REDESCRIPTIONS,
NEW COMBINATIONS AND DISTRIBUTIONAL DATA
FOR PREVIOUSLY KNOWN SPECIES

Tydeus carya (Baker, 1968) new combination
(Figs. 38-47)

Paralorryia carya Baker, 1968b.

ADULT FEMALE (Fig. 38). Length of body 345-357 µm; width 212-224 µm. Dorsum of body without reticulate pattern; dorsum with three pairs of lateral dimples formed by the striae, striae with transverse lobes (Fig. 47). Dorsal body setae strong and serrate except the trichobothrium, which is filiform and smooth.

Setal measurements: \( p_1 \) 16 µm; \( p_2 \) 17 µm; \( p_3 \) 19 µm; \( d_1 \) – \( d_5 \) subequal 18 µm; \( h_2 \) 16 µm; \( l_1 \) and \( l_4 \) subequal 18 µm; \( l_5 \) 19 µm; \( p s \) 17 µm; \( s \) 42 µm.

All legs terminate in two claws and a hairy empodium with a claw (Figs 39-42). Solenidion on tarsus I long (9 µm) and slender. Solenidion on
tarsus II short (3 \(\mu\)m); seta \(k\) and tibia I forked (Figs 39-40).

Setal pattern of palp: 6(1)-2-2. Terminal eupathidium thick and elongate; seta \(d\) simple and slender, seta \(ba\) very short (Fig. 43). Moveable digit of chelicera (Fig. 44) longer (30 \(\mu\)m) than palptarsus (20 \(\mu\)m).

Aggenital and genital setae setiform (Fig. 45).

**ADULT MALE.** Similar to female except genital area (Fig. 46).

**COLLECTION DATA.** 13 females and 15 males: Kullaberg (Loc. 4), *ex* bark of dead tree (*Pinus* sp.), collected April 14, 1992, *leg. Lundqvist.*

**REMARKS.** Baker (1968b) described the male of *T. carya* from specimens collected on carya bark, Pennsylvania. The female is until now undescribed. According to André’s (1980) definition of the genus, *P. carya* should be moved to *Tydeus.*

Our specimens collected on bark in southern Sweden agree fairly well with Baker’s description with the exception of the length of some dorsal setae (especially \(p_2\) and \(d_2\)) and possibly the stria­tion. However, since the type is not available for study, we do not have support to establish a new taxa for the Swedish material.

**Tydeus funki** (Baker, 1968) new combination
(Figs. 48-56)

**Lorryia funki** Baker, 1968a.

**ADULT FEMALE** (redescription of holotype, Fig. 48): Opisthosoma: reticulated ill-defined areas around the base of the dorsal setae, plus a few more areas, stria­tion with square lobes; cells of reticulated areas connected with square (X-shaped) cross­ties (Fig. 53). All dorsal setae plumose except the trichobothria, which are filiform and smooth. Setal measurements: see table 1. Ventral: Only five genital setae could be observed on one side, no genititals at all on the other side (Fig. 54). Epimeral formula as for the genus. Leg chaetotaxy as for the genus (Figs 49-52); dorsal setae on femur, genu and tibia plumose. Each apotele of the legs has two claws and an empodial hook, solenidion on tarsus I (8 \(\mu\)m, Fig. 49) is almost three times longer than that on tarsus II (3 \(\mu\)m, fig. 50). Terminal setae on palptarsus difficult to see. Moveable digit of chelicera (14 \(\mu\)m) slightly shorter than palptarsus (16 \(\mu\)m).

No female was found in our samples from Sweden.

**ADULT MALE** (Swedish material). Similar to female except genital area (Fig. 56). Setal measurements: see table 1. Solenidion on tarsus I (7 \(\mu\)m) slender, seta \(k\) on tibia I simple. Setal pattern of palpus 6(1)-2-2. Terminal eupathidium bidentate distally; seta \(d\) simple and slender; seta \(ba\) short (Fig. 55). Moveable digit of chelicera slightly longer (15 \(\mu\)m) than palptarsus (12 \(\mu\)m).

Aggenital and genital setae setiform (Fig. 56).

**TYPE DATA.** Holotype, female, USNM no. 3193, *ex* debris in *Asyndesmus lewisi* (Gray) [ = *Melanerpes lewis*, Lewis’ Woodpecker] nest, 2 miles S of Fort Collins, Colorado, March 7, 1959; *leg. R.C. Funk.*

**COLLECTING DATA (SWEDEN)**: One male; Dörröd (Loc. 2), *ex* tree hole, *Salix fragilis*, collected July 13, 1993, *leg. Lundqvist.*

**REMARKS.** The male of this species has not been previously described.

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<th>seta</th>
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<th>male (Sweden)</th>
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**TABLE 1:** Measurements (in \(\mu\)m) for two specimens of *T. funki.* Left and right refer to how the specimens are orientated on the slide. Accuracy: ± 0.65 \(\mu\)m for setae, ± 3.16 \(\mu\)m for body measurements.
There are noteworthy differences between the two specimens from USA and Sweden, especially the length of some of the dorsal setae (which might be sex related) and the relative length of the moveable digit compared to the palptarsus. The reticulated areas of the opisthosoma are not distinct and difficult to compare from one specimen to another. Considering the limited material we have at hand, these differences do not justify the naming of a new taxa based on the Swedish material.
Tydeus insignia (Livshitz), 1973 new combination


**COLLECTION DATA:** One female, and five tritonymphs from Norrekås (Loc. 6), ex moss and lichens on pine tree (Pinus sp.), collected July 20, 1993.

**Tydeus jaculus,** Kuznetzov, 1973

**COLLECTION DATA:** One male from Södra Åreda (Loc. 9), ex moss on soil surface.

**Tydeus maturus** Livshitz, 1973

**COLLECTION DATA:** Two females and two males from Vomb (Loc. 10), ex Lichens, Cladonia sp., on ground, collected April 28, 1992.

**Tydeus obstinatus** Livshitz, 1973

**COLLECTION DATA:** One female from Alnarp (Loc. 1), ex bark of apple tree, collected May 11, 1992.

**Tydeus polygonata** (Kulczycki, 1992), new combination


**COLLECTION DATA:** Two females, one male, and five tritonymphs from Prästtorpsjön (Loc. 7), ex lichens on twigs on ground, collected April 14, 1992.

**REMARKS:** Kulczycki (1992) described *T. polygonata* from fruit orchards in the Ternopol region, Ukraine. Our specimens agree with his description, except for seta *d* on the palp, which is divided in our specimens as opposed to slender in Kulczycki's description.

**Tydeus unguis** Karg, 1975

**COLLECTION DATA:** Two females from Vomb (Loc. 10), ex Lichens on pine twigs on ground, collected April 28, 1992.

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