

WATER MITES OF THE GENUS *TIPHYS* KOCH, 1836 (ACARIFORMES: PIONIDAE) IN RUSSIA

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ABSTRACT: This study presents a detailed taxonomic review of water mites of the genus *Tiphys* Koch, 1836 (Hygrobatoidae: Pionidae) found in Russia during a long-term survey period between 1970 and 2008. The review includes (re)descriptions and illustrations of all known active stages of 18 *Tiphys* species found in this country: *Tiphys bullatus* (Thor, 1899), *T. ensifer* (Koenike, 1895), *T. uchidai* Viets, 1956; *T. lapponicus* (Neuman, 1880), *T. latipes* (Müller, 1776), *T. pistillifer* (Koenike, 1908), *T. gladiator* Tuzovskij, 2005; *T. ornatus* Koch, 1836; *T. scaurus* (Koenike, 1892), *T. scaurellus* Tuzovskij, 1983; *T. torris* Koenike, 1914; *T. anadyrensis* sp. n., *T. chaunensis* sp. n., *T. kamchatkaensis* sp. n., *T. kolymaensis* sp. n., *T. minutiporus* sp. n., *T. samaraensis* sp. n. and *T. yaroslavlensis* sp. n. Separate keys to all species based on females, males, deutonymphs and larvae are presented.

KEY WORDS: water mites, Pionidae, *Tiphys*, morphology, systematics, identification keys, female, male, deutonymph, larva, Russia.

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INTRODUCTION

Water mites, inhabiting various types of fresh-water biotopes, comprise a vast taxonomic group within the cohort Parasitengona (Acariformes) named in the acarological literature as Hydracarina, Hydrachnellae or Hydrachnidia. Like other members of the Parasitengona, the life cycle of water mites typically includes an egg, three active stages (six-legged larva, eight-legged sexually un-

differentiated deutonymph, and eight-legged sexually differentiated adult), and three inactive resting stages (prelarva, protonymph and tritonymph). The resting stages are strongly reduced and represented only by integument; they do not have organs except for provisional ones. Larvae differ greatly from other active stages in their ecology and morphology. Water mite larvae typically parasitize aquatic and semi-aquatic insects, although in some cases larvae transform into deutonymphs without feeding. Deutonymphs and adults are free-living predators feeding on various small invertebrates. Adults and deutonymphs are well adapted for a subaquatic life, but most larvae have adaptations for aerial existence. The idiosoma of water mites is typically provided with a constant number of setae, which are associated with glandularia in deutonymphs and adults but not in larvae.

The present study is a taxonomic revision of water mites of the genus *Tiphys* Koch, 1836 (Hygrobatoidae: Pionidae) occurring in the fauna of Russia. It includes descriptions of all known stages of species found in this country and provides keys to all of these species and stages.

The world fauna of the genus *Tiphys* currently includes about 50 species and subspecies (K.O. Viets 1987). In the monograph “Limnofauna Europaea”, K.O. Viets (1978) reported 9 species in Europe: *Tiphys bullatus* (Thor, 1899), *T. convexipalpis* Ponyi, 1956; *T. ensifer* (Koenike, 1895), *T. lapponicus* (Neuman, 1880), *T. latipes* (Müller, 1776), *T. ornatus* Koch, 1831; *T. pistillifer* (Koenike, 1908), *T. scaurus* (Koenike, 1892) and *T. torris* Koenike, 1914. From the territory of the former USSR, the following species were recorded by Sokolow (1940): *Tiphys bullatus*, *T. ensifer*, *T. latipes*, *T. ornatus*, *T. scaurus* and *T. torris*. Investigations of water mites from different regions of

Russia over the past thirty years allowed me to describe two further species, *T. scaurellus* Tuzovskij (Tuzovsky 1983) from the Magadan Province and *T. gladiator* Tuzovskij from the Yaroslavl Province (Tuzovsky 2005). In addition, two more species have been found in the territory of Russia: *T. lapponicus* (Neuman, 1880) from Ladoga Lake (Sokolow and Yankovskaya 1962; Yankovskaya 1965) and *T. pistillifer* (Koenike, 1908) from the Yaroslavl Province (Tuzovsky 2008).

In water mites, including representatives of the genus *Tiphys*, species descriptions and ecological research deal mainly with the adult stage (Piersig 1897–1900; Koenike 1909; Soar and Williamson 1929; Motaş 1928; Viets 1936; Sokolow 1940; Lundblad 1956, 1962; Besseling 1964; Szalay 1964, etc). For most water mites, larvae and deutonymphs either are unknown or too poorly studied to be included. Generalized data on pre-imaginal stages are given in a few publications for larvae (Sparing 1959; Prasad and Cook 1972; Smith 1976; Wainstein 1980; Smith and Cook 1991) and for deutonymphs (Viets 1936; Tuzovsky 1990).

Morphology of *Tiphys* larvae has been described for the following taxa: *T. americanus* (Marshall), *T. diversus* (Marshall) (Prasad and Cook 1972; Smith 1976); *T. ornatus* (Piersig 1897–1900; Uchida 1932; Sparing 1959; Prasad and Cook 1972); *T. bullatus* (Viets 1919); *T. daisetsuensis* Imamura (Imamura 1954); *T. eremitus* Prasad and Cook (Prasad and Cook 1972); *T. vernalis* Habeeb, 1954 (Smith 1976), *T. brevipes* (Habeeb, 1954) (Smith 1976); *T. scaurus*, *T. cooki* Smith (Smith 1976); *T. haliki* Conroy (Conroy 1982), *T. scaurellus* Tuzovskij (Tuzovsky 1983) and *T. pistillifer* (Koenike, 1908) (Tuzovsky 2008).

A key of water mite larvae proposed by Wainstein (1980) contains very short descriptions of larvae of four *Tiphys*-species: *T. ornatus*, *T. latipes*, *T. ensifer* and *T. lutescens* (Hermann, 1804). The latter species is usually assigned to the genus *Pionopsis* (K. Viets 1956; Prasad and Cook 1972; Cook 1974, Smith 1976; K.O. Viets 1987).

Information on the morphology of deutonymphs has been given for a few species: *Tiphys bullatus* (Viets 1919; Soar and Williamson 1929); *T. latipes* (Piersig 1897–1900); *T. ornatus* (Piersig 1897–1900, 1901; Koenike 1909; Sokolow 1940); *T. scaurus* (Besseling 1974). A key to water mite deutonymphs (Tuzovsky 1990) included descriptions of *T. lapponicus*, *T. ornatus* and *T. scaurellus*.

The present work gives a detailed taxonomic review of water mites of the genus *Tiphys* found in

Russia between 1970 and 2008. The review includes (re)descriptions and illustrations of all known active stages of 18 species found so far in this country. Separate keys to all species based on females, males, deutonymphs and larvae are presented.

METHODS AND MATERIAL

Water mites of the genus *Tiphys* live in temporary ponds, bogs, springs and streams. A dip net with 0.2 mm mesh size was used to collect mites in habitats with water plants (pools, bogs, littoral zone of lakes and water bodies). For standing-water sites without vegetation, I used a scraper to cut off the upper layer of substrate. In flowing streams the scraper and the dip net loaded by a few stones were used. The contents of sample was washed and placed into a large bucket with water, and then small portions of that sample were examined part by part in a white dish. Mites (adults and deutonymphs) were taken by a pipette and placed into cupping-glasses or test-tubes. After that, mites were either mounted on permanent slides or fixed for long-term storage.

Permanent slides were made with fresh specimens not fixed in Koenike's-fluid using Hoyer's medium (Baker and Wharton 1952). Mouthparts were separated first; then the body was covered with a cover slip and the contents was gently squeezed out by means of slow pressing from the posterior to the anterior end. When the body was clean, it was washed and mounted on a glass slide. The mouthparts were arranged so that pedipalps, chelicerae and capitulum can be easily seen in lateral view. In the case of working with specimens that had been in fixative for a long time, mites were dissected along lateral line, cleared and washed out in the water. Mouthparts, dorsal and ventral sides were mounted on a slide. The mite body and its mouth parts were always mounted on the same slide.

To rear larvae, water mites were maintained in laboratory conditions. Eggs and larvae were obtained from females kept individually in glass or transparent plastic vessels (diameter 10–15 mm, height 15 mm). Fragments of tree leaves, sedge stalks or other substrates from the habitat where mites had been collected were added to the vessels. Collected deutonymphs were held until their transformation into adult mites. When the deutonymphs turn to the adult mites, an additional feeding is usually necessary for them. Young chironomid larvae and small crustaceans collected in the same water body as the deutonymphs were usually

offered to freshly moulted adults. It was seldom possible to bring young deutonymphs (with coxal plates occupying more than half ventral body surface) to the size required for transformation to adult mites even with additional feeding. Mature deutonymphs (with relatively shorter coxal plates) could transform to adult mites even without the additional feeding. Vessels with deutonymphs, adult mites or eggs were always covered with a gaze or cover glass as mites often attempted to leave them, especially when no additional substrate was provided. Other details for collecting water mites, their maintenance in laboratory conditions, and mounting of slides are given in Prasad and Cook (1972), Cook (1974), Sokolow (1940), Tuzovsky (1987, 1990, 2007).

Unless stated otherwise, all material used in the present study was collected by the author in different regions of Russia in the period 1970–2008. Moreover, the collections of water mites deposited in the Institute for Biology of Inland Waters of Russian Academy of Science (Borok, Yaroslavl Province) were investigated. Material for comparison was loaned from the private collection of Dr. Reinhard Gerecke (Zoological Institute of the University of Tübingen, Germany) and Dr. Henk van der Hammen (The Netherlands).

Descriptions and redescriptions are given according to the standard schemes proposed by Prasad and Cook (1972) (for larvae) and Tuzovsky (1990, 2007) (for adults and deutonymph). The terminology for idiosomal setae and slit organs follows Tuzovsky (1987). All measurements are in micrometers. The number of measured specimens is indicated for each stage. Only little-known synonymy is provided; exhaustive synonymies for most species considered in the present paper were provided by Viets (1956), Lundblad (1962) and K.O. Viets (1987).

Abbreviations and designations used in the text and figures

Idiosomal setae referred to respective segments:

Fch — frontales chelicerae (I)
Fp — frontales pedipalporum (II)
Vi — verticales internae (III)
Ve — verticales externae (III)
Oi — occipitales internae (IV)
Oe — occipitales externae (IV)
Hi — humerales internae (V)
He — humerales externae (V)
Hv — humerales ventralia (V)
Sci — scapulares internae (VI)

Sce — scapulares externae (VI)
Li — lumbales internae (VIII)
Le — lumbales externae (VIII)
Si — sacrales internae (IX)
Se — sacrales externae (IX)
Ci — caudales internae (X)
Pi — praeanales internae (XI)
Pe — praeanales externae (XI)
Ai — anales internae (XII)
Ae — anales externae (XII)

Other structures of idiosoma and appendages:

i1–i5 — slit organs.

P-1–5 — pedipalp segments (trochanter, femur, genu, tibia, tarsus)

I-Leg 1–6 — leg number and segments 1–6 (trochanter, basifemur, telofemur, genu, tibia, tarsus)

tr — trochanter,

f — femur

g — genu

ti — tibia

ta — tarsus

bf — basifemur

tf — telofemur

s1 — proximal solenidion on tibia of leg I–II in larva

s2 — distal solenidion on tibia of leg I–II in larva

as — acanthoid seta (terminal seta on tarsi I–III)

dp.1–dp.3 — dorsal plates

vl.1–vl.4 — ventrolateral plates

ey — eye

eyp — eye plate

ags — anterior genital sclerite

pgs — posterior genital sclerite

gp — genital plate

ac1–3 — genital acetabula (first, second, third)

bsch — basal segment of chelicera

st — cheliceral stylet

C1–C4 — coxal setae

apl–ap3 — coxal apodemes

aasc — anterior anal sclerite

pasc — posterior anal sclerite

pregen — pregenital plate

gen — genital plate

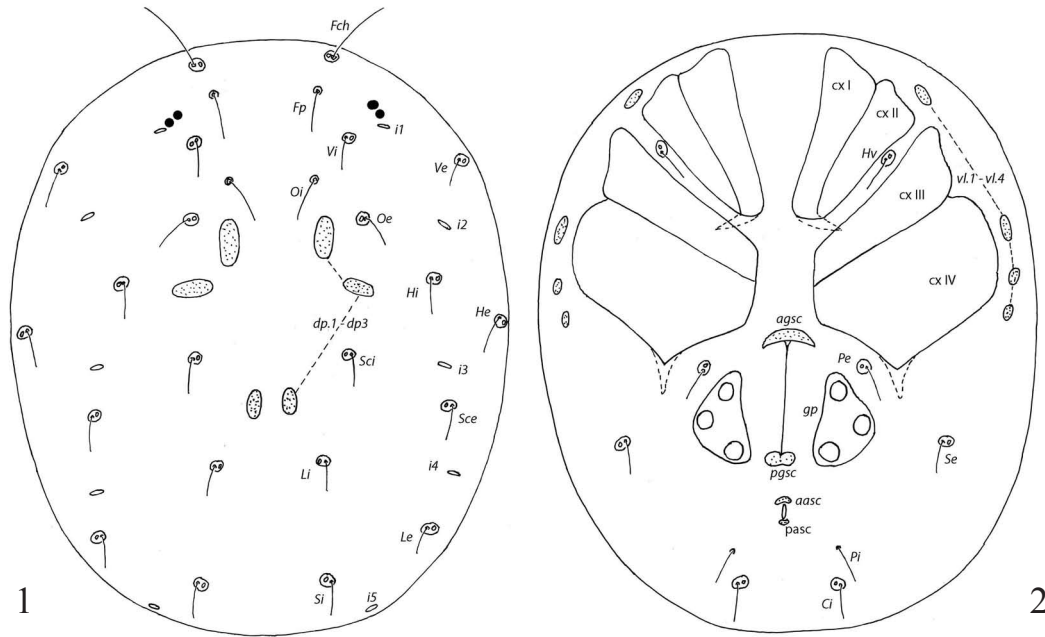
cx I–cx IV — coxal plates

epp — excretory pore plate

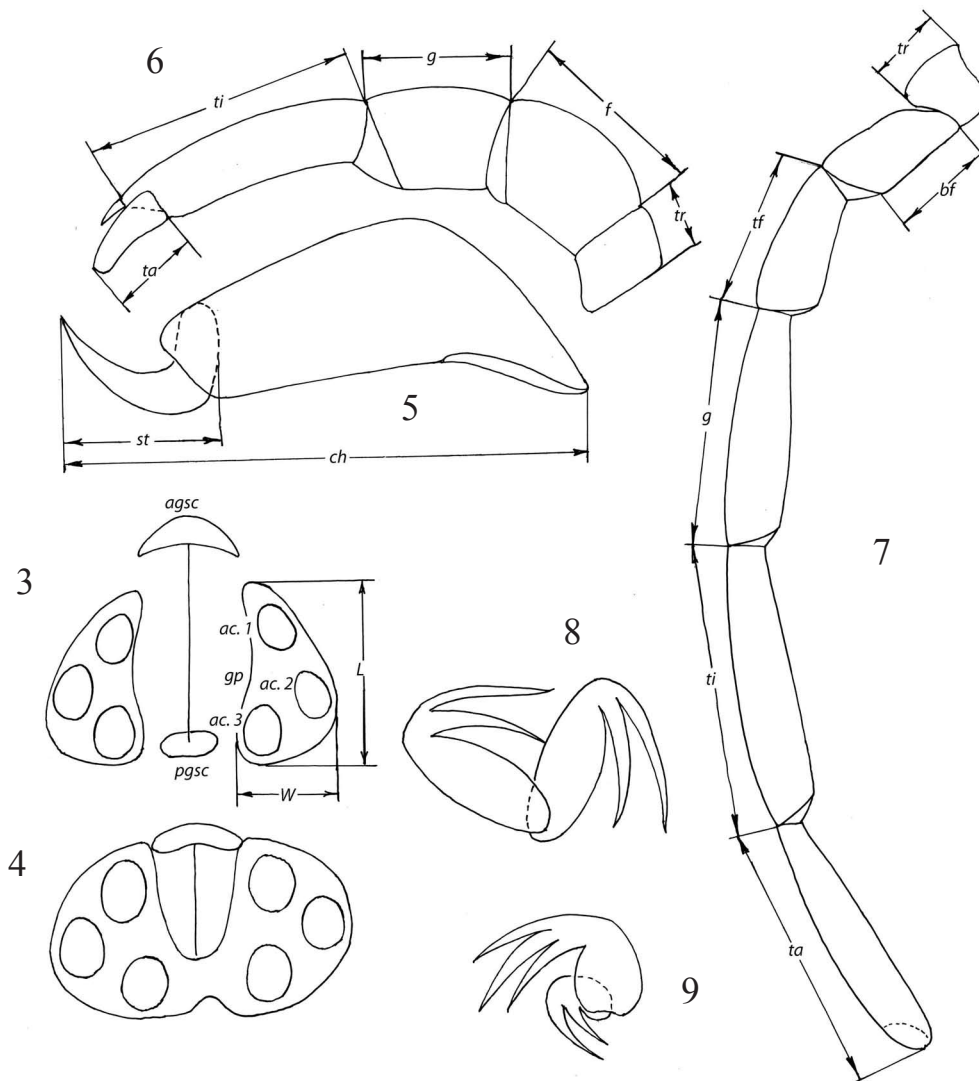
tmas — transverse muscle attachment scar

ur — urstigma

Specimen depositories and reference to accession numbers are given using the following abbreviation: IBIW — the Institute of Biology of Inland Waters of the Russian Academy of Science (Borok, Yaroslavl Province, Russia).



Figs 1–2. General view of idiosoma and terminology of adult mite of the genus *Tiphys* (scheme): 1 — dorsal view, 2 — ventral view. See abbreviations in the text.



Figs 3–9. The scheme of measurements of details of a structure of adult mite of the genus *Tiphys*: 3 — external genital organ of female, 4 — external genital organ of male, 5 — chelicera, 6 — pedipalp, 7 — leg, 8 — leg III claws of female, 9 — leg III claws of male.

Morphology

Adult mites

Although water mites lack distinct traces of segmentation or subdivision into tagmata (Fig. 1), arrangement of dorsal plates and glandularia likely reflect the ancestral segmentation. Tuzovsky (1987) suggested that the body of water mites of all active stages consists of 10 recognizable segments and anal lobe (the numbering takes in account segment VII which is reduced in all acariform mites (Sitnikova 1978): I — segment of chelicerae, II — segment of pedipalp, III — vertical (legs I), IV — occipital (legs II), V — humeral (legs III), VI — scapular (legs IV), (VII — reduced), VIII — lumbar, IX — sacral, X — caudal, XI — praeanal and XII — anal lobe.

The segments VIII–X are genital ones. The four anterior segments of the body constitute the anterior tagma (proterosoma), and the remaining ones represent the posterior tagma (hysterosoma), although in water mites these tagmata are not delimited. The idiosoma bears five pairs of lyriform organs (*il*–*i5*). The anterior pair (*il*) is always situated in immediate proximity to lateral eyes and referred to proterosoma; others of four pairs (*i2*–*i5*) correspond to anterior segments of hysterosoma, i.e. humeral, scapular, lumbar and sacral segments.

For the systematics of the genus *Tiphys*, shape and size of idiosomal plates, legs III and IV, coxal plates of all legs, pedipalps and genital field in adult mites are the most taxonomically valuable characters. The following three pairs of plates are recognized on the dorsal surface of idiosoma (Fig. 1): one pair of anteromedial plates, one pair of anterolateral plates, and one pair of posteromedial plates. The ventral surface of the body bears the following plates (Fig. 2): four pairs of lateral plates (ventrolateral 1–4), and two unpaired genital sclerites (anterior and posterior). The medial margins of coxae IV are well developed.

The genital field (Fig. 3) is provided with a pair of plates and typically three pairs of acetabula (as an exception, in *T. mitchelli* Cook, four to six pairs are present). Genital plates are separated in females, but fused to each other in males (Fig. 4). In general, the anterior genital sclerite of the male lies separate, but occasionally it is fused to the genital plate. Genital setae are variously arranged along the lateral and posterior edges of genital plates, in females more numerous than in males.

As typical for all parasitengone mites, the capitulum bears two pairs of setae (*h1*–*h2*). The ros-

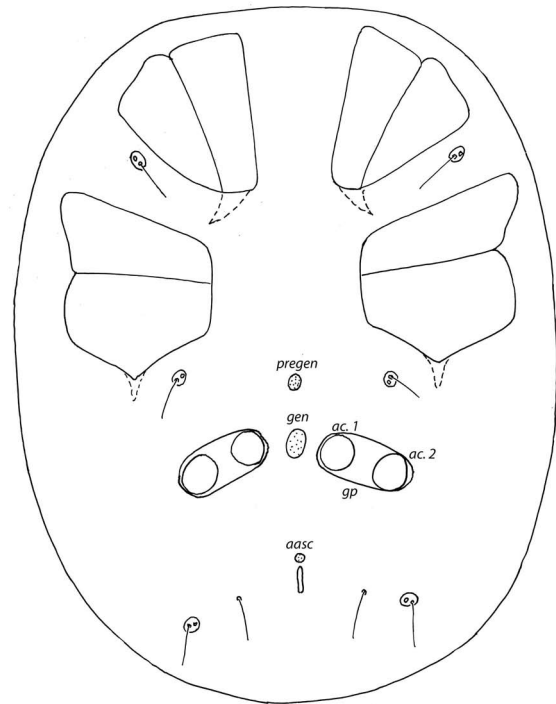


Fig. 10. Ventral view of deutonymphs of the genus *Tiphys* (scheme).

trum is short, located ventrally and not reaching the anterior edge of capitulum.

The chelicerae (Fig. 5) consist of two segments, the large basal segment with convex dorsal edge and a small, crescent-shaped movable chela (or stylet). Pedipalps (Fig. 6) consist of five segments: trochanter, femur, genu, tibia and tarsus. The pedipalpal tibia has a dorsoapical or distolateral peg-like seta.

Legs (Fig. 7) consist of six segments: trochanter, basifemur, telofemur, genu, tibia and tarsus. Coxae of all legs from plates on the ventral surface of the body. On each side, coxae I–II and coxae III–IV are fused forming two large coxal plates in females (Fig. 2) and in deutonymphs (Fig. 10). Plates of the posterior coxal group are well separated in females and deutonymphs and close to each other in males. Legs are provided with swimming setae, the segments from trochanter to tibia bear numerous thin and thick setae; tarsi bear mainly thin setae. The two tarsal claws on all pairs of legs in adult and deutonymphs have two symmetric denticles each (Fig. 8), claws of leg III in males are asymmetric (Fig. 9).

Deutonymphs

Deutonymphs are rather similar to females and differ mainly in smaller size and external structure of the genital area. The genital opening is absent. External structures of the genital field (Fig.

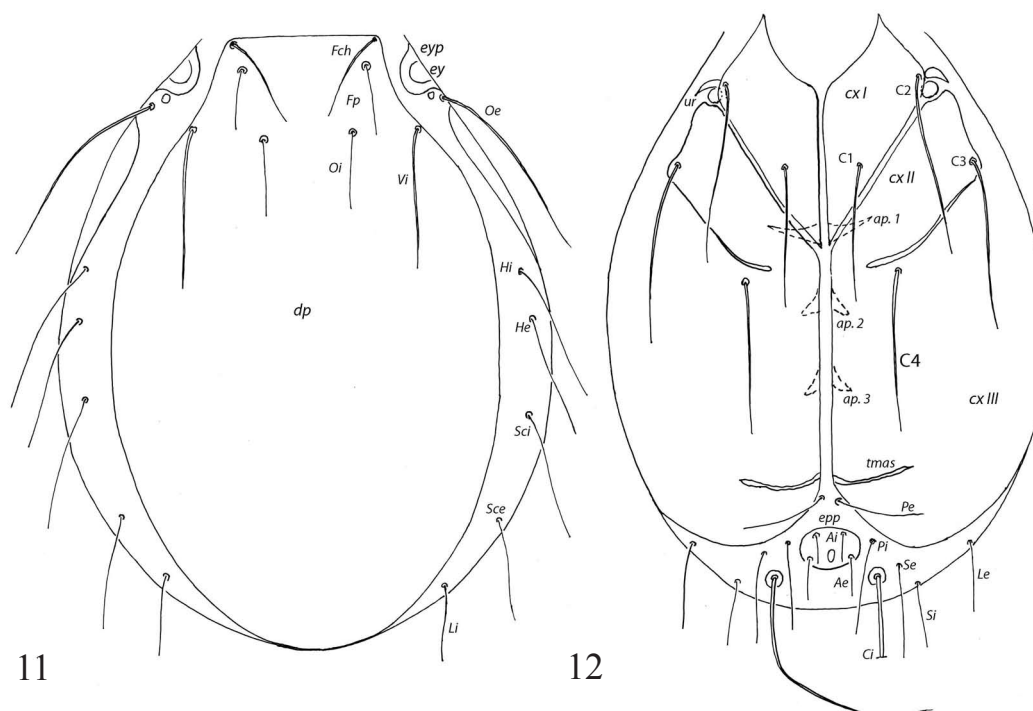


Fig. 11–12. General view of idiosoma and abbreviations of larva of the genus *Tiphys* (scheme): 11 — dorsal view, 12 — ventral view. See abbreviations in the text.

10) are represented by the anterior and posterior pairs of acetabula (*ac.* 1–2), two genital plates (*gp*), a genital sclerite (*gs*), and a pregenital sclerite (*pregen*). Three pairs of genital setae are located along the anterior edge of the genital plates. The number and arrangement of idiosomal setae and slit organs are similar to adults. All idiosomal plates are developed to a lesser extent or some parts of plates are reduced, and the number of setae on pedipalpal and leg segments is lower than in adult mites.

Larvae

The morphology of larvae greatly differs from that of deutonymphs and adult mites. Larvae have three pairs of legs and a well sclerotized idiosoma (Figs 11–12). The formula of idiosomal setation is 2–2–2–4–4–4–4–4–2–4–4. Idiosomal segment III lacks setae *Ve*; segment V lacks setae *Hv*, segment XII (anal lobe) bears two pairs of setae. There are no glandularia. The dorsal surface of idiosoma (Fig. 11) has a large shield bearing four pairs of setae (*Fch*, *Fp*, *Vi*, *Oi*). Lateral eyes are separated from each other and situated on small platelets on each side. Coxae of legs II and III are fused to each other but are separated from coxae I; coxae I have two setae; coxae II and III each bear one seta (Fig. 12). Larval organs or urstigmata (*ur*) are small and more or less circular, occupy a lateral position on the body border between coxae I and II and are provided with a cup. The excretory pore plate is

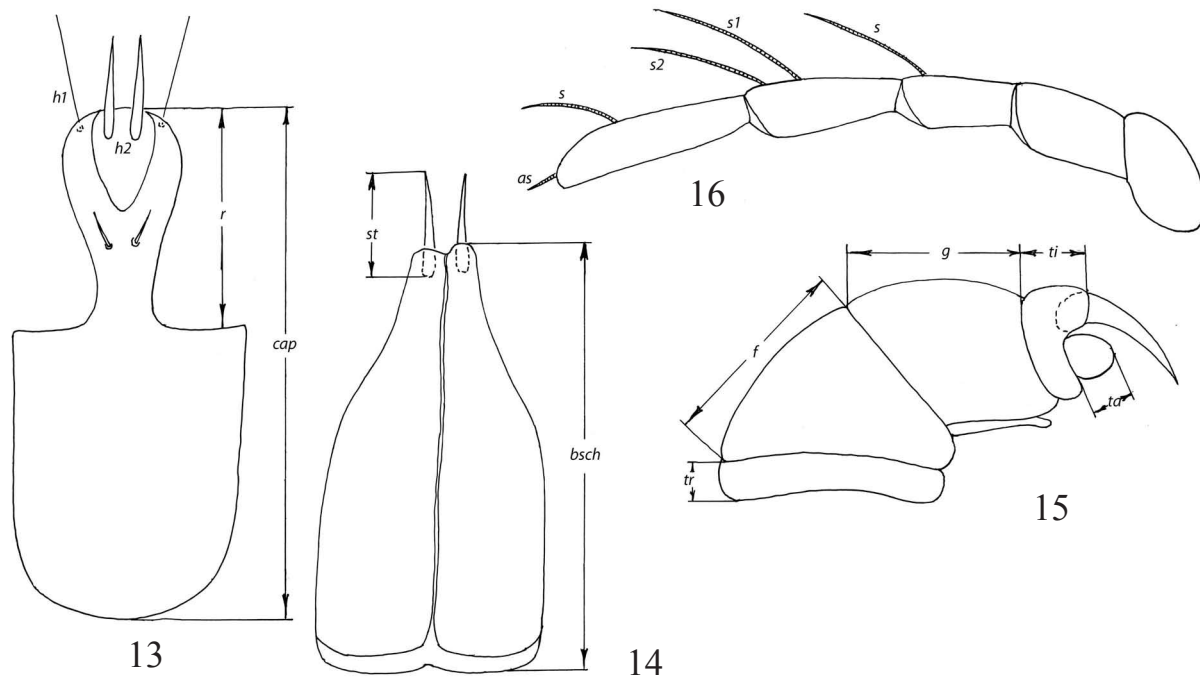
moderately developed, and setae *Ai* and *Ae* are rather long. The anterior four pairs of lyriform organs (*il*–*i4*) are situated dorsally; the fifth pair (*i5*) is situated usually ventrally between the excretory pore plate and setae *Ci* or *Se*.

The capitulum (Fig. 13) has a well developed rostrum; the anterodorsal setae (*h1*) of the capitulum are longer and thinner than the ventral ones (*h2*). The basal segments of chelicerae (Fig. 14) are rather large and medially fused to each other. The cheliceral stylet is crescent-shaped, without subapical denticles. Pedipalps (Fig. 15) are short and stocky, have five free segments with the setation formula (P-1–5): 0, 1, 2, 4, 8 (*s*). Pedipalpal femur and genu are relatively elongated; the tibia is short with a thick, curved dorsodistal claw; the tarsus is very small. Legs consist of five segments (Fig. 16). Claws have a large central empodium and a pair of thin ambulacra. Number of setae on segments of legs is constant, with the following setation formula, except eupathidia: I–Leg. 1–5: 1, 7, 5 (*s*), 10–11 (2*s*), 14 (*s*, *as*); II–Leg. 1–5: 1, 7, 5 (*s*), 11 (2*s*), 13 (*s*, *as*); III–Leg. 1–5: 1, 6, 5(*s*), 10 (*s*), 11 (*as*). Sensillae (chemosensory setae) are situated only on the three distal segments of legs.

SYSTEMATICS

Genus *Tiphys* Koch, 1836

Type species: *Tiphys sagulatus* Koch, 1836.
By original designation.



Figs 13–16. The scheme of measurements of details of a structure of larvae of the genus *Tiphys*: 13 — capitulum, 14 — chelicera, 15 — pedipalp, 16 — leg I.

Diagnosis. Adult. Characters of the family Pionidae; body soft, with small dorsal and ventral platelets. Coxal plates in females in four groups, in males usually posterior coxal groups (in some species also anterior coxal groups) fused medially; posteromedial setae of coxae IV hair-like; anterior coxal group with short posterior apodemes; medial margins of coxae IV well developed; typically with three pairs of genital acetabula but in one species, *T. mitchelli* Cook, four to six pairs present; typically, male pregenital sclerite separated from genital field (occasionally fused with the remainder of the genital field); male without petiole; leg IV of male, especially genu (IV–Leg-4), exhibiting sexual dimorphism; tarsus (III–Leg-6) modified for spermatophore transfer and exhibiting slight sexual dimorphism; peg-like seta at tip of P–IV usually well developed and without numerous heavy setae.

Deutonymph. Similar to females, differing mainly by smaller size and external structures of the genital field. Gonopore is absent. External structures of the genital field are represented by two acetabula (*ac.* 1–2) and three setae, which are located on a plate on each side, and genital (*gen*) and pregenital (*pregen*) sclerites; genital plates separate. All dorsal plates are developed to a lesser extent or absent.

Larvae. Dorsal plate large, covering nearly entire idiosoma, with four pairs of proterosomal setae. Anterior eyes on each side located on a

plate, posterior eyes in soft integument. Suture line between coxal plates II–III incomplete, obliterated medially; four pairs of setae on coxal plates; two pairs of setae on excretory pore plate. Bases of setae *C4* close to corresponding suture lines between coxal plates II and III (separated from them by 1–2 diameters). Setae *Ci* is very long and whip like. Number of setae on legs I–III, except eupathidia, as follows: I–Leg 1–5: 1, 7, 5 (*s*), 10–11 (2*s*), 13 (*s*, *as*); II–Leg 1–5: 1, 7, 5 (*s*), 11 (2*s*), 13 (*s*, *as*); III–Leg 1–5: 1, 6, 5(*s*), 10 (*s*), 11 (*as*).

Geographic Distribution. Holarctic (Cook 1974).

Remarks. Karl Viets (1936, 1956) divided the genus into three subgenera, *Tiphys* s. str., *Pionides* Thor, 1911 and *Acercopsis* Viets, 1926, based on male features expressing the sexual dimorphism. In the subgenus *Tiphys*, the genital bay of male is relatively shallow, the genital field bears scattered setae; basifemur of leg II is without a ventrodistal hump, genu of leg IV does not terminate with a single heavy and curved seta, tibia of leg II is without heavily thickened (spatulate or sword-like) setae. In *Pionides*, the genital bay is very shallow, the genital field bears scattered setae; genu of leg IV bears terminally a single, long and curved seta, basifemur of leg II is without a ventrodistal hump and tibia of leg II is without heavily thickened setae. In *Acercopsis*, the genital bay is relatively deep, the genital field bears nu-

Table
Known active stages of *Tiphys* species recorded in Russia

Species	Stages			
	Male	Female	Deutonymph	Larva
<i>Tiphys ornatus</i>	+	+	+	+
<i>T. anadyrensis</i>	+	—	—	—
<i>T. scaurus</i>	+	+	+	+
<i>T. scaurellus</i>	+	+	+	+
<i>T. lapponicus</i>	+	+	+	+
<i>T. latipes</i>	+	+	+	+
<i>T. kamchatkaensis</i>	+	+	—	—
<i>T. kolymaensis</i>	—	+	—	+
<i>T. torris</i>	+	+	+	+
<i>T. samaraensis</i>	—	+	—	—
<i>T. yaroslavlensis</i>	+	—	—	+
<i>T. minutiporus</i>	—	+	—	+
<i>T. ensifer</i>	+	+	+	+
<i>T. chaunensis</i>	—	+	—	+
<i>T. bullatus</i>	+	+	—	—
<i>T. uchidai</i>	+	—	—	—
<i>T. pistillifer</i>	+	+	—	+
<i>T. gladiator</i>	+	+	—	—

merous setae arranged in four clusters; genu of leg IV does not terminate with a single, heavy and curved seta as in the subgenus *Pionides*, basifemur of leg II has a ventrodistal hump, tibia of leg II with one or two broadened (spatulate or sword-like) setae. This system was followed by subsequent acarologists (Sokolow 1940; Szalay 1974; Besseling 1974; Cook 1974; K.O. Viets 1987, etc. and also in the present work); although Smith (1976) considered *Pionides* as a distinct genus.

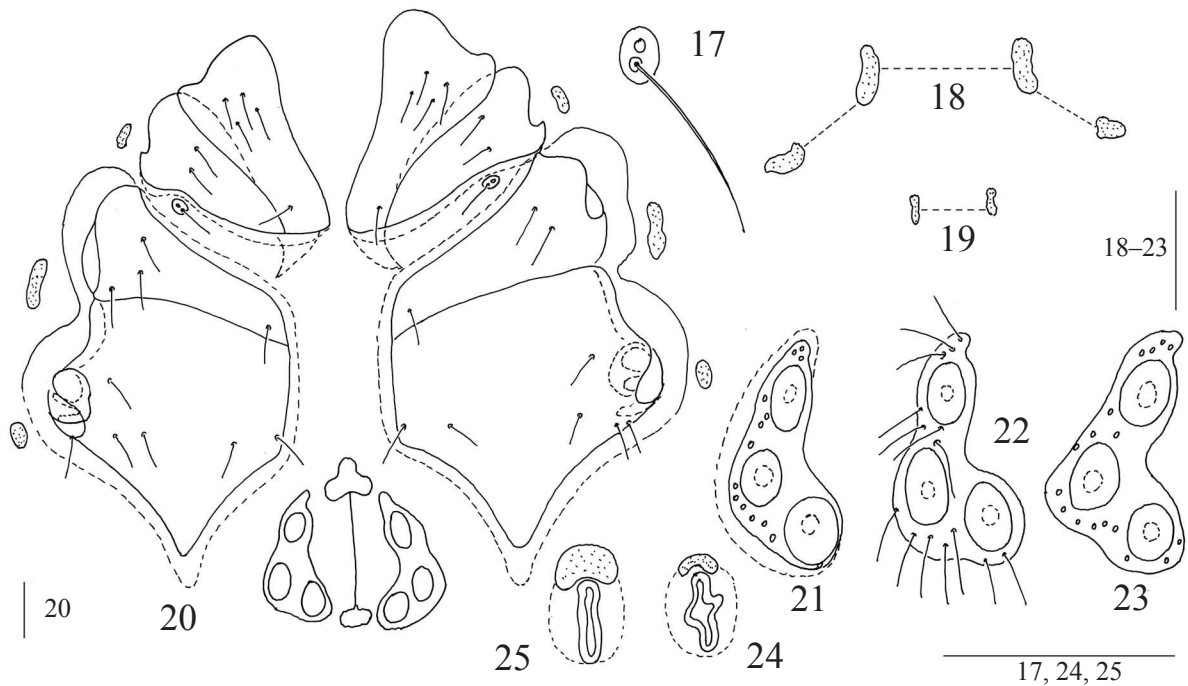
Classification of the genus *Tiphys* and remaining Tiphysinae is based exclusively on male features expressing sexual dimorphism. Females, deutonymphs and larvae exhibit species-specific characters, but cannot be referred to a particular genus or subgenus.

Biology. Larvae of almost all *Tiphys* species from Russia (Table) obtained from females in the laboratory failed to transform to deutonymphs in the lab. This means that they require a parasitic phase to continue the development — only larvae of *T. scaurellus* had transformed into the deutonymph without feeding (personal observations). Females lay eggs on diverse substrata (usually leaves or stalks of plants). The greatest number of eggs (30–60) was laid by females of *T. ornatus*, females of other species produced 10–40 eggs. In the laboratory, females commonly laid not all eggs, some

eggs usually remained in their body. Larvae parasitize imagines of all subfamilies of the family Chironomidae (Smith and Oliver 1976, 1986).

Adults and deutonymphs are active predators, feeding on small crustaceans or juvenile insect larvae (Smith 1976). According to observations in the middle latitude zone of the European part of Russia, adults and deutonymphs of *Tiphys* species occur throughout the whole period in temporary waters (April–July), but are most abundant in the first part of this period (Sokolow 1940; Tuzovsky 1974, 1996, 2007). Sokolow (1940) characterized some species as representatives of so-called “springtime fauna” although he did not give details concerning their phenology.

Males have a short life, usually no longer than one week. Spermatophore transfer is direct, involving copulation (Viets 1914; Mitchell 1957; Smith and Oliver 1986). Males die soon after sperm transfer, while females die after egg laying. Most females finish egg-laying before temporary basins disappear; larvae hatch and find a host. Subsequent destiny of larvae depends on these hosts, whether the host will lay eggs in the same water basin or will find another one; larvae quit their hosts when these return to the water and moult to protonymphs. If a water body dries out rapidly, larvae can find a shelter among plant roots and dead parts of plants. A



Figs 17–25. *Tiphys ornatus*, female: 17 — seta Fch, 18 — anteromedial and anterolateral dorsal plates, 19 — posteromedial dorsal plates, 20 — ventral view, 21–23 — genital plates, 24–25 — excretory pore. Scale bars = 100.

complete drying out of inhabited water basins commonly does not take place; the bottom of habitats colonized by *Tiphys* species retains enough moisture for survival of the mites, especially in forest biotopes. If rains partially refill such basins, further development can take place; deutonymphs and adults appear. All postlarval stages (and possibly also eggs) can hibernate in temporary waters, but there are no exact data on their physiological state in that period. In the course of my investigations in the Yaroslavl province (Europe: Russia), males and females of *T. torris* were recorded in a brook in July, August and September. Deutonymphs of *T. ornatus* were found in water bodies that had been thawed by rain. In those waters, at a water temperature of +2 C°, mites were found immobile, but quickly began moving when brought to laboratory conditions.

Tiphys (Tiphys) ornatus Koch, 1836

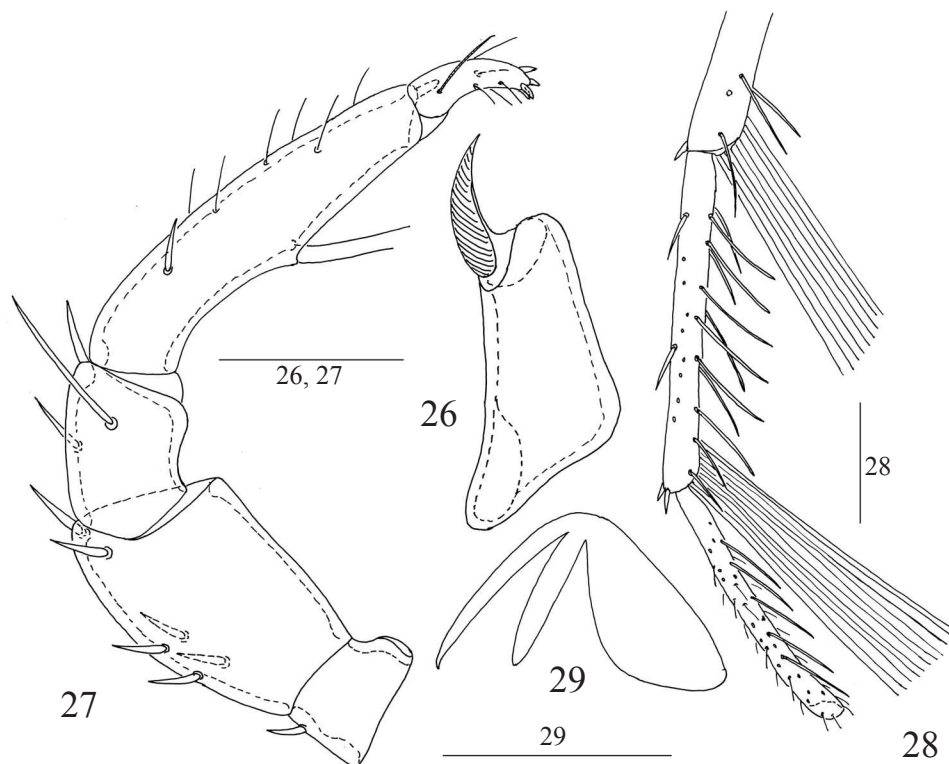
Figs 17–53

Material. 11 females, 1 male: Russia, Magadan Province, Anadyr Distr., Markovo: sedge-sphagnum bog on the left bank of the Anadyr river, 5 km upstream of the settlement, July 1978, P.V. Tuzovsky; 5 females, 1 male: Russia, Magadan Province, Tenka Distr., village Agrobasa, June–July 1979, P.V. Tuzovsky; 1 female: Russia, Kamchatka Province, Ust'-Kamchatsk Distr., sedge-sphagnum bog on right bank of the Kamchatka river, 40 km upstream from Ust'-Kamchatsk city, 18 July 1983, P.V. Tuzovsky; 14 females, 19 males

and 3 deutonymphs: Russia, Samara Province, National natural Park "Samara Luka", village Koltsovo, sedge bogs, May–June 1992–1994, P.V. Tuzovsky; 12 females, 5 males, 12 deutonymphs and 42 larvae reared in laboratory (IBIW): Russia, Yaroslavl Province, Nekouz Distr., Borok, temporary ponds, sedge bogs, sedge-sphagnum bogs, April–July 2000–2004, P.V. Tuzovsky.

Diagnosis. Female. Medial margin of coxal plate IV approximately twice as long as medial margin of coxae III. Posteromedial and posterolateral margins of coxae IV forming a large and acute angle. Genital plates elongate, acetabula arranged in an arc. Gonopore and genital plates approximately subequal in length. Pedipalpal genu with 3 setae, external lateral seta longer than the two other setae; base of external lateral seta situated near distal end of segment; pedipalpal tibia slender, both ventral setae inserted on very small tubercles near middle of segment; distolateral spine of tibia 2.5–3.0 times shorter than tarsus. Claws of legs I–III larger than claws of legs IV.

Male. Coxal plates IV greatly expanded, touching each other posteromedially; medial margin of coxal plate IV 3–4 times as long as medial margin of coxal plate III; posteromedial portions of coxal plates IV forming a deep rectangular bay of the genital field; genu of leg IV expanded dorsoventrally with slightly convex dorsal and ventral margins, tibia IV slightly curved with single fan-shaped dorsodistal seta and 6–8 distal long swim-



Figs 26–29. *Tiphys ornatus*, female: 26 — chelicera, 27 — pedipalp, 28 — genu, tibia and tarsus of leg IV, 29 — claw. Scale bars: 26–27 = 100, 28 = 200, 29 = 50.

ming setae; tarsus IV slender, slightly tapering distally with numerous short, fine setae and 5–6 relatively long, thick ones. Claws of legs III asymmetric, large claw with two nearly subequal denticles, small claw with relatively long external denticle and short internal one.

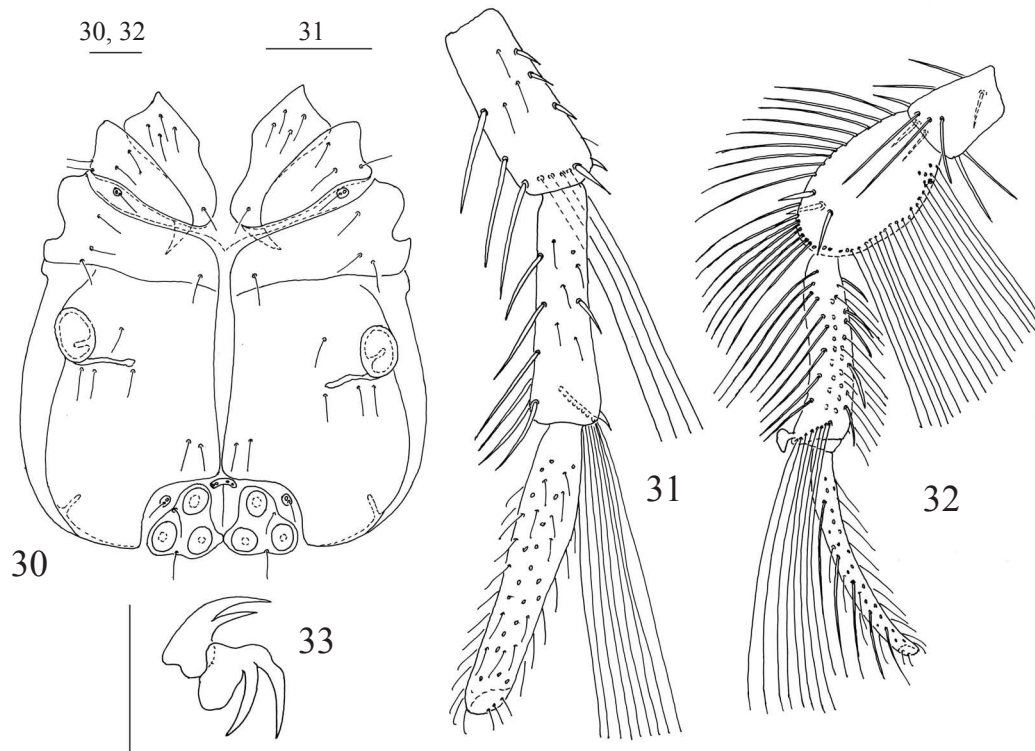
Deutonymph. Dorsum usually without true dorsal plates; medial margin of coxae IV slightly longer than medial margin of coxae III. Posteromedial angle of coxae IV moderately developed. Pedipalpal genu with 2 setae, external lateral seta longer than dorsodistal one, base of external lateral seta located distally to middle of segment; both ventral setae on tibia slightly separated and situated distally to middle of segment on minute tubercles, length of distolateral spine of tibia approximately in 1.5–2.0 times shorter than tarsus.

Larva. Dorsal shield elongate (ratio length/width 1.5–1.6). Setae *Fch* and *Vi* slightly longer than *Fp* and *Oi*. Dorsal shield with cell-shaped reticulation. Coxal setae C1 shorter than setae C2–C4, which are approximately equal in length. Base of setae C4 on coxal plate III located near medial end of suture line between coxal plates II and III. Posteromedial apodemes of coxal plates I distinctly developed, apodemes of coxal plates II and III slightly developed. Transverse muscle attachment scar present. Excretory pore plate wider than long, ratio length/width = 0.5–0.7; anal setae or in an almost

regular transverse row, or setae *Ai* located slightly anterior to setae *Ae*; setae *Ai* shorter than setae *Ae*; excretory pore located near posterior margin of excretory pore plate. Solenidion on genu of leg I longer than solenidia on tibia I; solenidion on genu II longer than distal solenidion on tibia II, proximal solenidion on tibia II shorter than distal one.

Description. Female. Dorsum with relatively large anteromedial, small anterolateral and posteromedial platelets (Figs 18–19). Anteromedial plates and posteromedial platelets elongate, anterolateral platelets transverse. Suture line between coxal plates III and IV slightly oblique, directed posteromedially. Medial margin of coxal plate IV approximately twice as long as medial margin of coxae III. Posteromedial margin and posterolateral margin of coxae IV forming large acute angle. Sclerites bearing setae *Hv*, situated on soft integument between coxal plates II and III, but closely to posterior margin coxal plate II. Three pairs of small unequal platelets present along lateral margins of coxal plates II–IV.

Genital plates elongate (Figs 21–23) with three acetabula and 10–17 thin short setae each, acetabula arranged in an arc; all acetabula approximately equal in size; distance between anterior and medial acetabula, and distance between medial and posterior acetabula less than diameter of one acetabulum. Gonopore and genital plates ap-



Figs 30–33. *Tiphys ornatus*, male: 30 — ventral view, 31 — genu, tibia and tarsus of leg III, 32 — telofemur, genu, tibia and tarsus of leg IV, 33 — claws of leg III. Scale bars = 100.

proximately subequal in length. Excretory pore with small anterior sclerite (Figs 24–25).

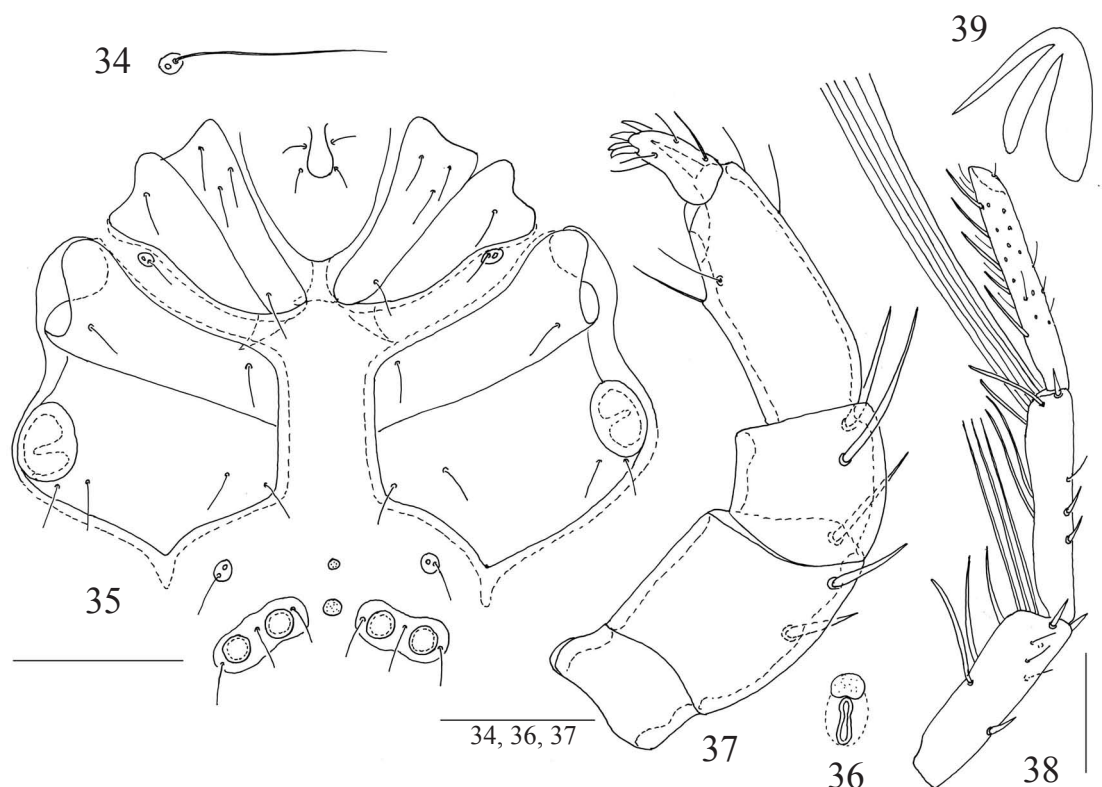
Basal segment of chelicera (Fig. 26) with large dorsal hump, cheliceral stylet relatively large, pointed.

Pedipalps (Fig. 27) slender. Ventral margin of femur straight or slightly convex, ventral margin of genu concave. Pedipalpal genu with three setae, external lateral seta longer than two other setae; base of external lateral seta situated near distal end of segment. Pedipalpal tibia long, slender with short distolateral peg-like seta, two ventral and several dorsal setae and single dorsoproximal spine. Both ventral setae inserted near middle tibia on very small tubercles, distolateral peg-like seta of tibia with rounded tip, 2.5–3.0 times shorter than tarsus. Pedipalpal tarsus with single long proximal solenidion, with five thin setae and four thick unequal distal spines.

All legs with swimming setae; two anterior pairs of legs with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 28). One or two swimming setae present on genu of legs I, 5–7 on tibia I, 5–9 on genu II, 7–12 on tibia II, 6–13 on genu III, 10–12 on tibia III, 4–12 on genu IV, 8–14 on tibia IV. Claws of legs I–III are larger than claws of legs IV. Internal denticle of claw of legs I–III rather wide with rounded tip, external denticle thin and pointed (Fig. 29).

Measurements, $n=10$. Idiosoma length 1200–2050, length of medial margin coxa III 60–90, length of medial margin coxa IV 125–165; length/width of anteromedial dorsal plates 65–70/20–25; length/width of genital plate 175–230/65–100; length/width of acetabula (*ac.* 1–3): 48–67/30–45, 48–60/36–45, 48–72/36–45; width of anterior genital sclerite 60–85, length of chelicera basal segment/claw 175–220/65–100; length of pedipalpal segments (P-1–5) 45–65, 130–205, 90–140, 195–255, 55–75; length of distolateral peg-like seta on tibia 12–18; length of leg segments (1–6) I-Leg: 85–125, 170–245, 200–325, 285–435, 245–480, 355–415; II-Leg: 100–140, 190–285, 200–360, 275–455, 315–475, 375–425; III-Leg: 120–150, 185–280, 135–345, 185–455, 250–500, 290–410; IV-Leg: 185–245, 170–320, 135–430, 245–615, 340–650, 405–490.

Male. Dorsal surface and coxae of legs I–III similar to female. Coxae plates IV greatly expanded, fused with each other posteromedially but separated anteriorly, but interspace between posterior coxal groups sclerotized. Medial margin of coxal plate IV 3–4 times as long as medial margin of coxal plate III. Posteromedial portions of coxal plate IV forming a deep more or less rectangular bay nearly completely embracing genital field. Genital plates triangular; all acetabula relatively large, approximately subequal in size, and ar-



Figs 34–39. *Tiphys ornatus*, deutonymph: 34 — seta Fch, 35 — ventral view, 36 — excretory pore, 37 — pedipalp, 38 — genu, tibia and tarsus of leg IV, 39 — claw. Scale bars: 34, 36–37 = 50; 35, 38 = 100, 39 = 25.

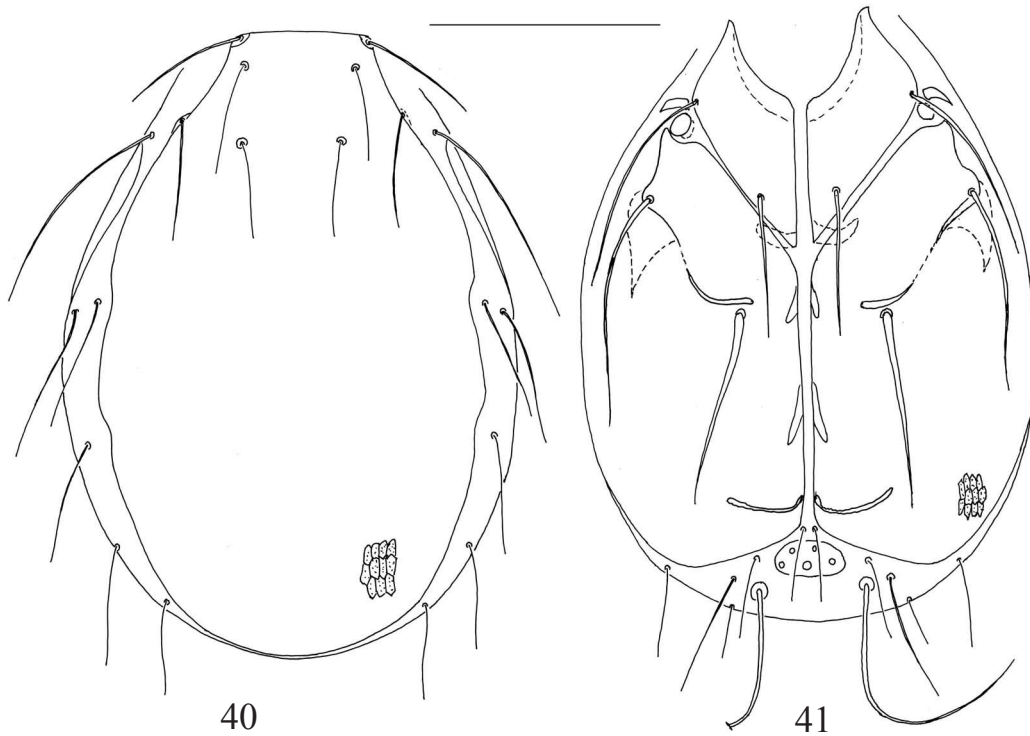
ranged in a triangle. Anterior genital sclerite small, with two pairs of short and fine setae and sometimes fused with genital plates. All sclerites bearing ventral idiosomal setae, lying in soft integument. Excretory pore with small anterior sclerite. Capitulum, chelicera and pedipalps as in female, but pedipalpal tibia with more numerous dorsal setae.

Genu III (Fig. 31) slightly shorter than tibia III, tarsus III longer than tibia III; genu III with 4–5 and tibia III with 8–10 long swimming setae. Telofemur IV (Fig. 32) considerably shorter than genu IV. Genu IV expanded dorsoventrally with slightly convex dorsal and ventral margins, bearing numerous thin dorsal and ventral setae and several relatively short distal sword-like setae; dorsal setae shorter and thicker than ventral ones. Tibia IV slightly curved, with concave dorsal and convex ventral margins, with numerous unequal setae, a single fan-shaped dorsodistal seta and 6–8 long distal swimming setae. Tarsus IV slender, slightly tapering distally, with numerous short, fine setae and 5–6 relatively long, unequal thick ones. Claw of legs I and II as in female. Claws of legs III asymmetric, large claw with nearly subequal clawlets, small claw with relatively long dorsal clawlet and short ventral clawlet (Fig. 33).

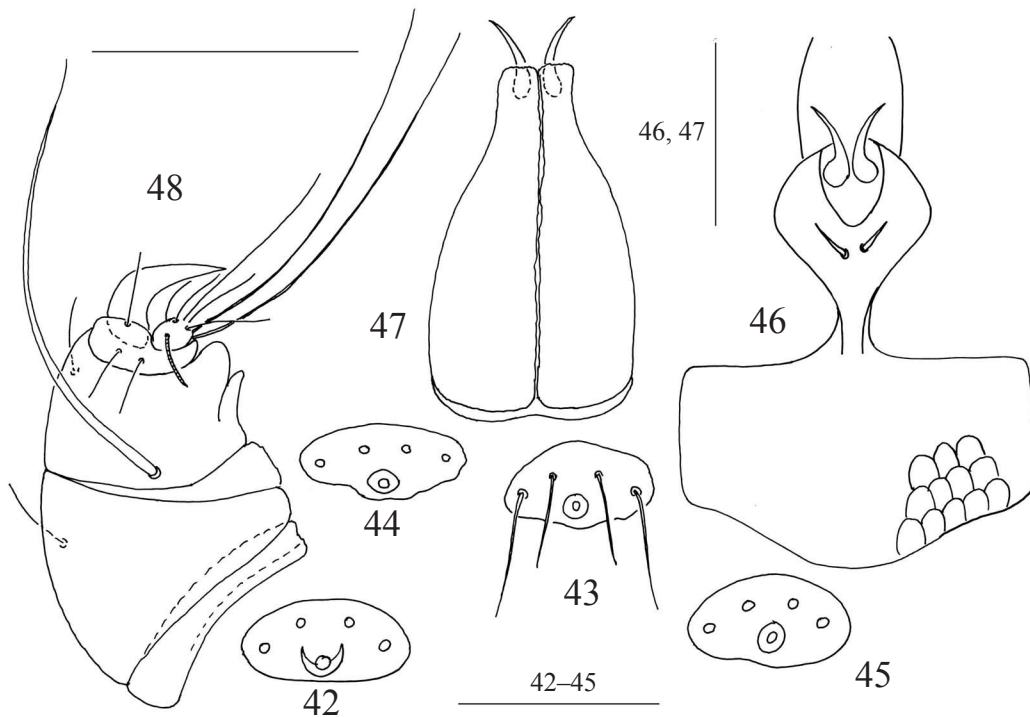
Measurements, $n=10$. Body length 730–960, length of medial margin of coxa III 60–115, length

of medial margin of coxa IV 270–345; length of anteromedial dorsal plates 60–70, width 15–18; length of genital plates 120–130, their general width 215–240; length/width of genital acetabula (*ac.* 1–3): 48–55/30–42, 48–60/36–45, 42–60/30–45; length of basal segment of the chelicera 135–170; length of cheliceral stylet 65–75; length of pedipalpal segment (P-1–5): 40–50, 120–145, 80–100, 145–185, 40–57; length of distolateral spine on tibia 13–17; length of leg segments: I-Leg. 1–6: 85–105, 170–180, 200–230, 285–300, 245–280, 390–400; II-Leg. 1–6: 100–125, 190–195, 200–220, 275–295, 315–335, 395–415; III-Leg. 1–6: 120–125, 135–180, 185–205, 250–270, 290–335; IV-Leg 1–6: 185–205, 170–205, 135–180, 245–310, 340–410, 400–490.

Deutonymph. Dorsum usually without true dorsal plates, sometimes fragments of anteromedial plates present. Suture line between coxal plates III and IV oblique, directed posteromedially. Medial margin of coxae IV slightly longer than medial margin of coxae III. Posteromedial angle of coxae IV moderately developed. Genital plates separated, oblique, directed anteromedially, with more or less parallel anterior and posterior margins. Both acetabula approximately subequal in size, distance between them less than diameter of one acetabulum. Postgenital sclerite larger than pregenital sclerite.



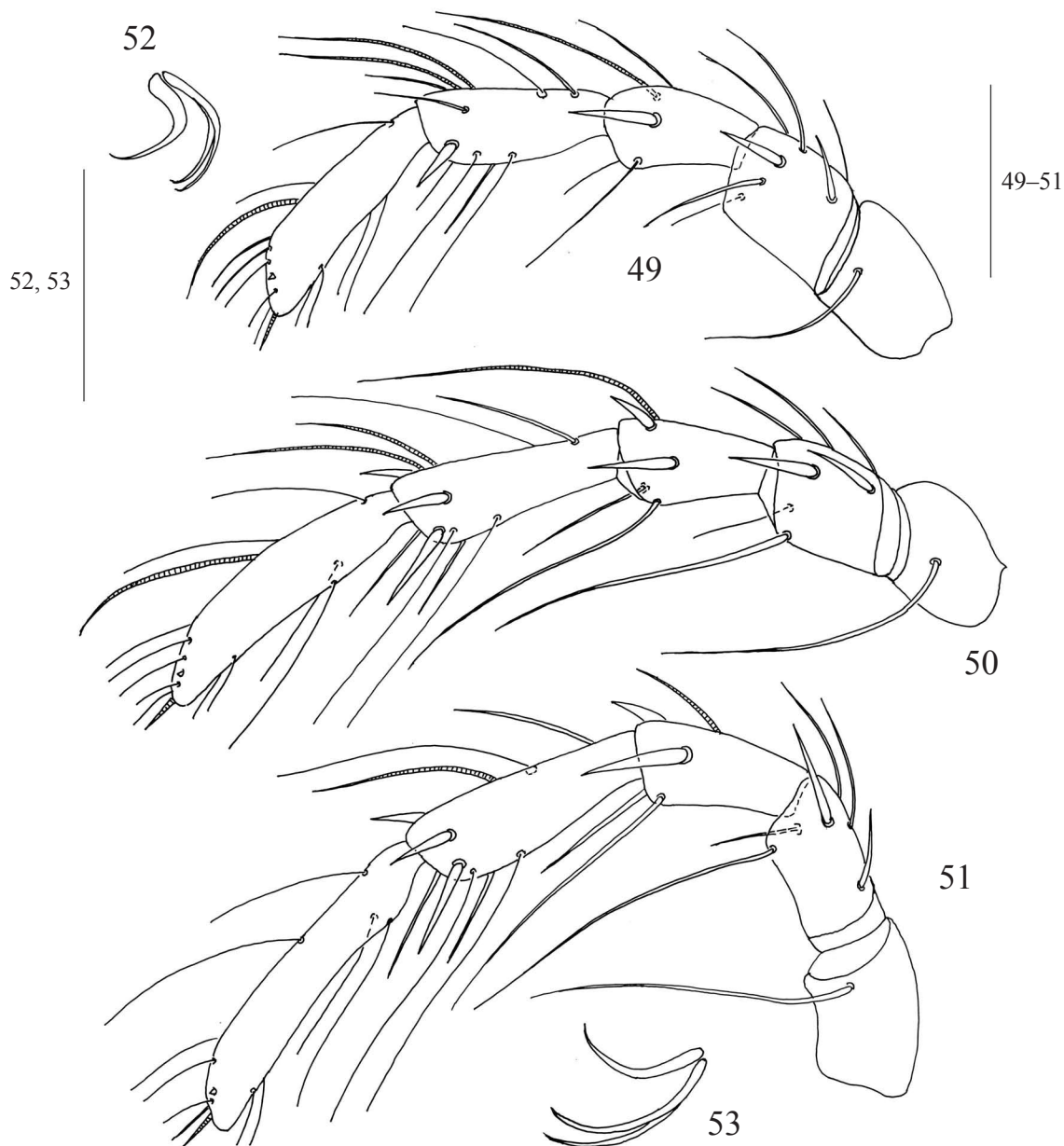
Figs 40–41. *Tiphys ornatus*, larva: 40 — dorsal view, 41 — ventral view. Scale bar: 40–41 = 100.



Figs 42–48. *Tiphys ornatus*, larva: 42–45 — excretory pore plate, 46 — capitulum (ventral view), 47 — chelicerae, 48 — pedipalp. Scale bars: 42–47 = 50, 48 = 100.

Ventral margin of femur straight or slightly convex, ventral margin of genu straight or slightly concave. Pedipalpal tibia longer than femur, with rather long distolateral peg-like seta, two ventral setae and 1–2 dorsodistal ones. Both ventral setae separated and situated in distal half of tibia on very small tubercles, distolateral peg-like seta rather large, 1.5–2.0 times

shorter than tarsus. Legs II–IV with swimming setae; legs II with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 38). Two swimming setae present on genu II and genu III, 2–4 on tibia II, 4–6 on tibia III, 1–2 on genu IV and 5–7 on tibia IV. Claws of legs I–III larger than claws of legs IV, in shape as in females (Fig. 39).



Figs 49–53. *Tiphys ornatus*, larva: 49 — leg I, 50 — leg II, 51 — leg III, 52 — claws of leg I, 53 — claws of leg III. Scale bars: 49–51 = 50, 52–53 = 25.

Measurements, $n=5$. Body length 570–855, length of medial margin of coxa III 42–50, length of medial margin of coxa IV 60–65; length of genital plates 60–65, width 37–42; diameter of genital acetabula (*ac.* 1–2): 18–22, 21–25; length of basal segment of chelicera 90–120; length of cheliceral stylet 40–55; length of pedipalpal segments (P-1–5): 24–30, 70–90, 40–55, 85–100, 32–40; length of distolateral peg-like on tibia 20–27; length of leg segments: I-Leg. 1–6: 49–55, 55–70, 80–90, 105–130, 125–165, 145–180; II-Leg. 1–6: 55–65, 65–75, 75–100, 110–130, 130–165, 155–180; III-Leg. 1–6: 55–65, 65–80, 75–100, 95–140, 145–170, 145–180; IV-Leg. 1–6: 80–100, 90–100, 95–115, 135–170, 170–205, 180–210.

Larva. Dorsal shield elongate (ratio length/width 1.5–1.6). Setae *Fch* and *Vi* slightly longer and thicker than *Fp* and *Oi*. Setae *Oe* longest and heaviest of all dorsal setae, and setae *Li* shorter than other dorsal setae. Dorsal shield with punctate scale-like patterns.

Setae C1 thin and shorter than setae C2–C4, which are approximately equal in length; C4 much heavier than C1, base of setae C4 on coxal plate III located anteriorly, very close to medial end of suture line between coxal plates II and III. Postero-medial apodemes of coxal plates I developed distinctly, apodemes of coxal plates II and III relatively slightly developed. Transverse muscle attachment scar well developed and located in the

posteromedial portions of coxal plates III. Setae *Ci* very long and heaviest of all ventral idiosomal setae and situated on small bases, setae *Si* shortest of all ventral idiosomal setae. Coxal plates I–III with a pore like structure and slightly developed reticulations on it.

Excretory pore plate (Figs 42–45) wider than long, ratio length/width = 0.5–0.7. Setae *Ai* and *Ae* located on anterior half of plate and forming almost regular transverse row, or setae *Ai* located slightly in front of setae *Ae*; *Ai* shorter than *Ae*. Excretory pore located near posterior margin of excretory pore plate. Capitulum (Fig. 46) small, rounded posteriorly, scale like patterns occupy nearly all ventral surface of capitular base; anterior hypostomal setae longer and thinner than posterior ones. Dorsodistal setae of femur and genu of pedipalps short, thin and approximately equal in length; proximal lateral genual seta very long and very heavy; tibia with 3 approximately subequal setae and large dorsodistal pointed claw; tarsus very small with 1 short solenidion, 2 long setae and 5 short unequal simple ones.

Number of setae on legs I–III (Figs 49–51), except eupathidia: I–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 14 (s, ac); II–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5: 1, 6, 5(s), 10 (s), 11 (ac). Formula of large setae on leg segments: I–Leg 1–5: 0, 2, 1, 1, 0; II–Leg 1–5: 0, 2, 2, 3, 0; III–Leg 1–5: 0, 2, 2, 3, 0. Solenidion on genu I longer than solenidia on tibia I, both solenidia on tibia I approximately subequal in length; proximal solenidion on tibia II shorter than distal one, solenidion on genu II longer than distal solenidion on tibia II; solenidion on genu III shorter than solenidion on tibia III. On tarsi of legs I and II, empodia bent at a right angle and ambulacra only slightly bent (Fig. 52). Distal part of empodium of leg III turned onto ventral side at obtuse angle (Fig. 53).

Measurements, n=10. Length of the dorsal shield 240–310, width 150–190; length of the anal plate 12–18, width 23–35; length of the capitulum 95–100; length of basal segment of the chelicera 67–95, length of the chelicera stylet 16–20; length of medial margin of the coxae I 70–80, length of medial margin of the coxae II+III 110–140; length of excretory pore plate 12–18, width 23–32; length of the pedipalpal segments (P-1–5): 6–8, 30–32, 19–24, 8–10, 6–7; length of the legs segments: I–Leg. 1–5: 32–44, 32–36, 35–38, 40–52, 52–60; II–Leg. 1–5: 38–44, 28–40, 32–42, 52–58, 72–80; III–Leg. 1–5: 36–46, 35–42, 38–45, 54–65, 68–85.

Remarks. European larvae of *T. ornatus* differ from North American specimens attributed to this species (characters states from Prasad and Cook, 1972 in parentheses) in the well elongated dorsal shield, length/width 240–310/150–190, ratio 1.5–1.6 (slightly elongated, length/width 216–249/157–172, ratio 1.3–1.4), and the scale-like patterns occupying nearly the whole ventral surface of capitular base (present as a circle in the middle of capitular base).

Ecology. Temporary ponds, sedge-sphagnum bogs and lakes with macrophytes; permanent waters (Smit and Van der Hammen 2000).

Geographical distribution. Holarctic: Europe, Asia, North Africa (Algeria), North America (USA) (Sokolow 1940; Viets 1956; Cook 1956; Lundblad 1968; K.O. Viets 1978).

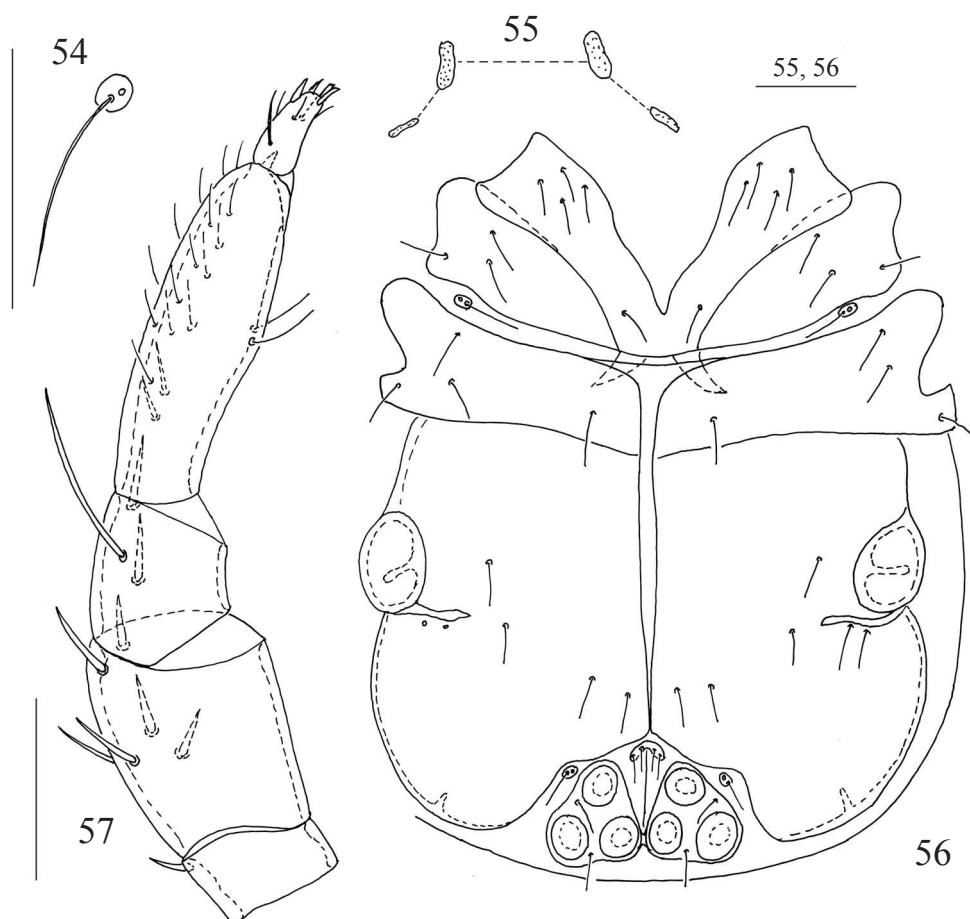
Tiphys (Tiphys) anadyrensis sp.n.

Figs 54–61

Material. Holotype male (IBIW 2303): Asia, Russia, Magadan Province, Anadyr Distr., Markovo: small lake on right bank of the Anadyr river, 13 km downstream of the settlement, 1 July 1978, P.V. Tuzovsky. Paratype: 1 male, Russia: Magadan Province, Anadyr Distr., Markovo: collected in some lake as holotype, 11 June 1981, P.V. Tuzovsky.

Diagnosis. Male. Anterior coxal groups fused to each other posteromedially; medial margin of coxal plate IV 3.8–4.8 times as long as medial margin of coxal plate III; posteromedial portions of coxal plates IV forming a deep bay almost completely enclosing genital field. Genu IV expanded dorsoventrally with distinctly convex dorsal and ventral margins. Tibia IV slightly curved with concave dorsal and convex ventral sides bearing numerous setae and a single short, thick peg-like seta; long distal swimming setae absent. Claws of legs III asymmetric; large claw with two long curved nearly subequal in length denticles, external denticle pointed with short dorsal spur, internal denticle with rounded tip; small claw with two short pointed denticles, external denticle larger than internal one.

Differential diagnosis. The male of *T. anadyrensis* sp. n. is similar to the male of *T. ornatus*, from which it differs by the structure of the appendages. The anterior coxal group of *T. anadyrensis* is fused to each other posteromedially (Fig. 56), genu IV (Fig. 59) has distinctly convex dorsal and ventral margins and tibia IV is without long distal swimming setae. In contrast, in *T. ornatus*,



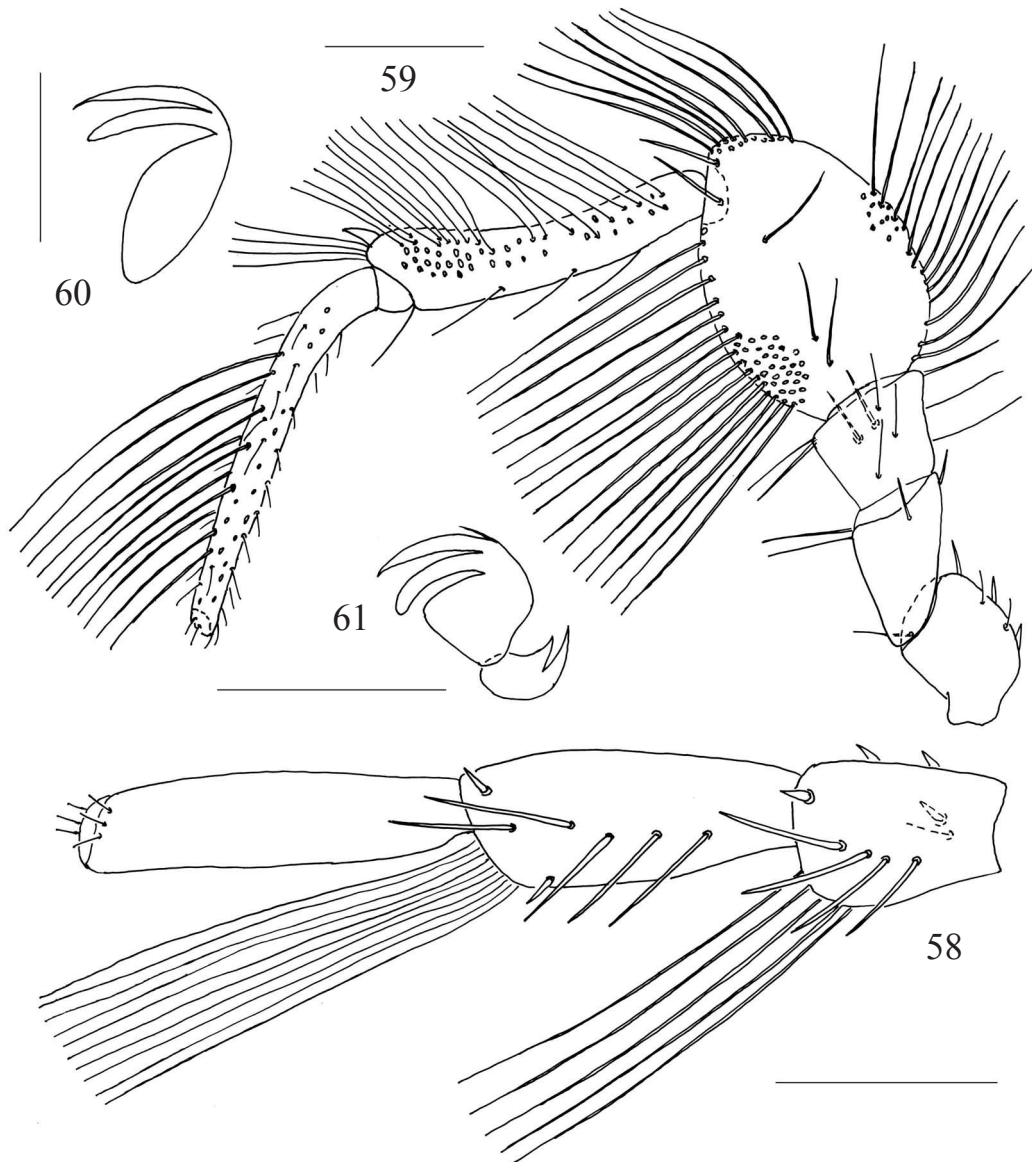
Figs 54–57. *Tiphys anadyrensis* sp. n., male: 54 — seta Fch, 55 — anteromedial and anterolateral plates, 56 — ventral view, 57 — pedipalp. Scale bars = 100.

the anterior coxal group is separated (Fig. 30), genu IV has slightly convex dorsal and ventral margins while tibia IV is with long distal swimming setae (Fig. 32).

Description. Male. Body oval, setae *Fch* long, whip-like (Fig. 54), other idiosomal setae filiform. Integument soft, with very fine strips. Dorsum with relatively large anteromedial and small anterolateral plates (Fig. 55), posteromedial platelets not developed; anteromedial plates larger than anterolateral ones. Coxal plates occupying most of the ventral surface (Fig. 56), coxae IV considerably longer than wide, touching posteriorly but separated anteriorly, interspace between posterior coxal groups sclerotized. Anterior coxal groups fused to each other posteromedially; anterior apodemes rather large, extending beyond medial edge of coxal plate III, posterior apodemes slightly developed. Coxal plate I with 4 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 3 lateral thin setae, coxal plate III with 3 lateral setae and 1 medial seta, coxal plate IV with 2 posteromedial setae and 3–4 short lateral ones. Medial margin of coxal plate IV 3.8–4.8 times longer than medial margin of

coxal plate III. Posteromedial portions of coxal plates IV forming a deep bay almost completely enclosing genital field; lateral margins of these coxal plates convex. Genital plates triangular and fused to each other posteromedially; all acetabula relatively large, approximately subequal in size, and arranged in triangular shape. Anterior genital sclerite very small, with two pairs of short, fine setae. Genital plates with 2 short, fine setae each. Sclerites, bearing setae *Hv* and *Pe*, situated on soft integument. Excretory pore with small anterior sclerite. Capitulum with short anchoral projection, both pairs of setae equal in length. The basal segment of chelicera with large dorsal hump. Cheliceral stylet relatively large, pointed.

Pedipalps (Fig. 57) rather slender. Pedipalpal trochanter with a single short dorsodistal seta, femur with 3–4 proximal and 2 dorsodistal short setae. Ventral margin of femur straight, ventral margin of genu slightly concave. Pedipalpal genu with 3 setae, external lateral seta considerably longer than two other setae; base of external lateral seta situated distally to middle of segment. Pedipalpal tibia long, slender, with short distolateral spine, 2

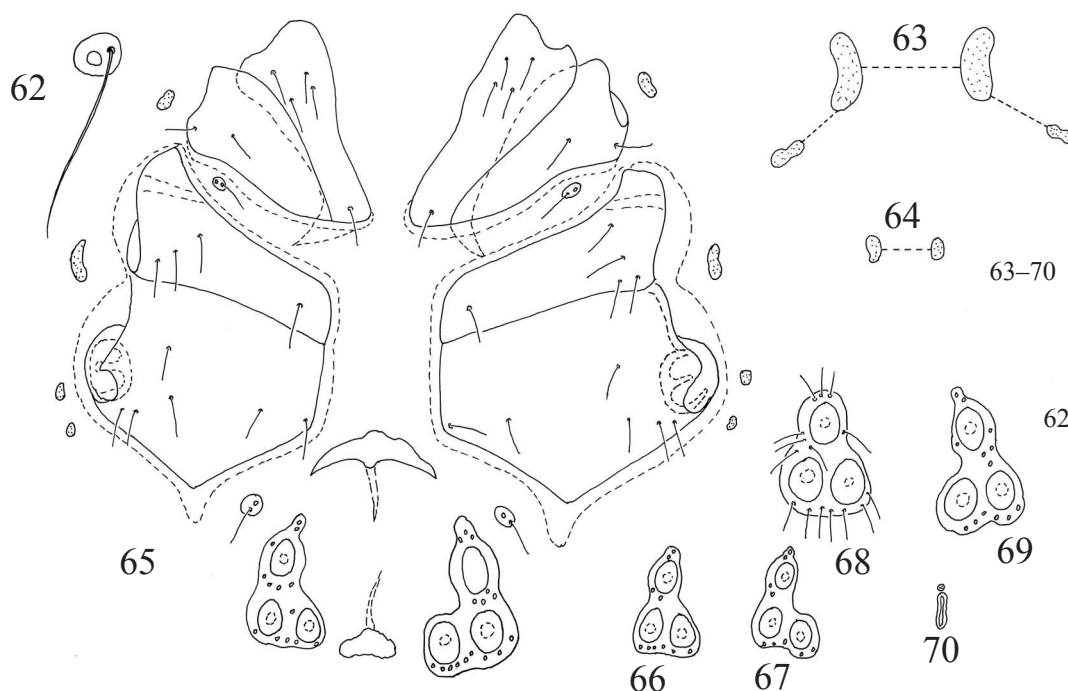


Figs 58–61. *Tiphys anadyrensis* sp. n., male: 58 — genu, tibia and tarsus of leg III, 59 — leg IV, 60 — claw of leg II, 61 — claws of leg III. Scale bars: 58 = 100, 59 = 200; 60–61 = 50.

ventral and numerous dorsal setae and 2 proximal spines. Both ventral setae inserted near the middle of tibia. Distolateral spine of tibia 3.0–4.0 times longer than length of tarsus. Pedipalpal tarsus with single long proximal solenidion, with 5 thin setae and 4 thick unequal distal spines.

Genu III (Fig. 58) shorter than tibia III, tarsus III slightly shorter than tibia III; genu III with 4–5 and tibia III with 8–10 long swimming setae. Telo-femur of leg IV (Fig. 59) considerably shorter than genu IV. Genu IV dorsoventrally expanded near the middle of segment comparing to telofemur IV, slightly tapering distally, bearing numerous dorsal and ventral thin setae, and several relatively short and thick setae; dorsal setae shorter than ventral ones. Part of dorsodistal surface of

genu IV in distal half without setae. Tibia IV slightly curved with concave dorsal and convex ventral sides and with numerous thin setae and single short peg-like dorsodistal seta; long distal swimming setae absent. Tarsus IV slender, slightly tapering distally, with numerous short and fine setae and with 10–11 relatively long unequal ones. Claws of legs I–II larger, than claws of legs IV. Internal denticle of claws of legs I–II with more or less rounded tip, external denticle pointed (Fig. 60). Claws of legs III asymmetric (Fig. 61), large claw with two long, curved and nearly subequal in length denticles; internal denticle with rounded tip; external denticle pointed, with short spur; small claw with two short pointed unequal denticles, external denticle larger than internal one.



Figs 62–70. *Tiphys scaurus*, female: 62 — seta Fch, 63 — anteromedial and anterolateral dorsal plates, 64 — posteromedial dorsal plates, 65 — ventral view, 66–69 — genital plates, 70 — excretory pore. Scale bars = 100.

Measurements (n=2). Body length 810–850, length of medial margin of coxa III 60–78, length of medial margin of coxa IV 285–300; length of anteromedial dorsal plates 35–42, their width 18–21; length of genital plates 95–110, their width 95–100; length/width of genital acetabula (*ac.* 1–3): 36–42/47–50, 60–62/42–44, 48–55/30–36; length of basal segment of the chelicera 163–180; length of cheliceral stylet 57–65; length of pedipalpal segment (P-1–5): 40–50, 114–116, 80–82, 163–172, 40–41; length of distolateral spine on tibia 12–18; length of leg segments: I–Leg. 1–6: 80–90, 160–165, 180–195, 250–255, 260–295, 365–375; II–Leg. 1–6: 95–105, 145–170, 195–205, 260–270, 305–310, 370–380; III–Leg. 1–6: 114–122, 145–165, 105–115, 120–140, 210–220, 245–255; IV–Leg. 1–6: 180–190, 160–165, 130–135, 325–345, 375–410, 445–480.

Ecology. Lake with macrophytes.

Geographical distribution. Asia, Russia: Magadan Province.

***Tiphys (Tiphys) scaurus* (Koenike, 1892)**

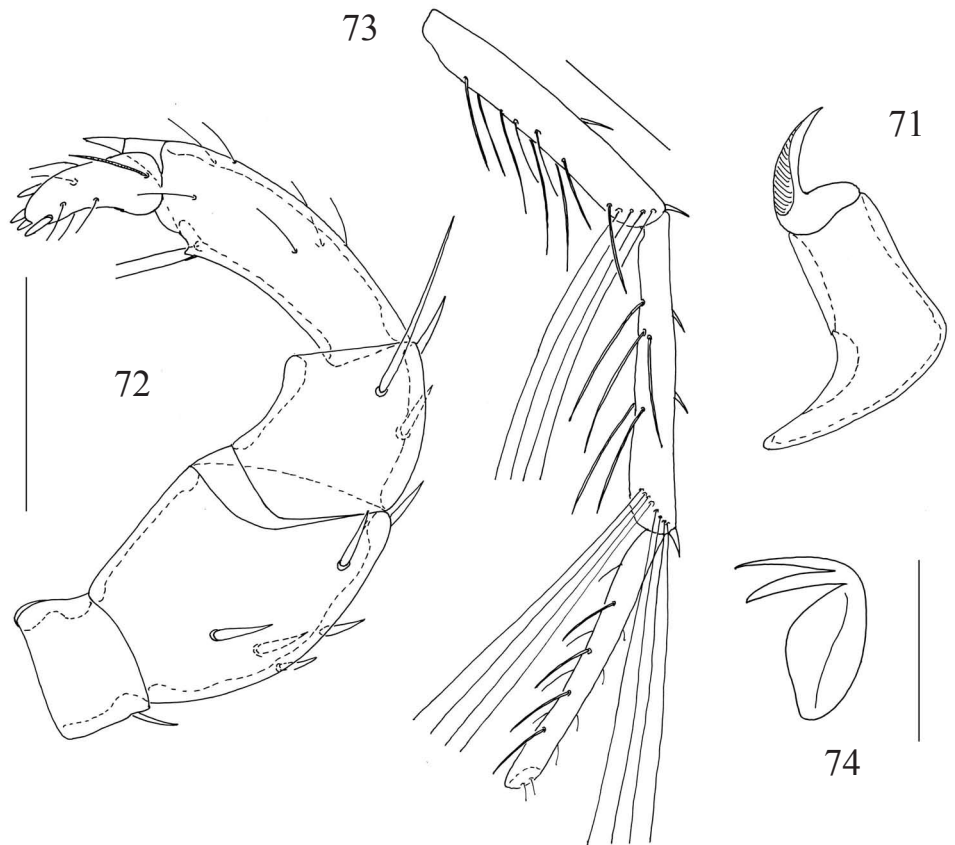
Figs 62–98

Material. 2 females: Russia, Magadan Province, Tenka Distr., village Agrobasa, 22 June 1979, 19 females, 7 males, 3 deutonymphs and 34 larvae reared in laboratory (IBIW): Russia, Yaroslavl Province, Nekouz Distr., Borok, temporary ponds, sedge bogs, sedge-sphagnum bogs, April–July

2000–2004, P.V. Tuzovsky; 1 male and 1 female: The Netherlands, H. van der Hammen.

Diagnosis. Female. Medial margin of coxal plate IV slightly longer than medial margin of coxal plate III. Posteromedial margin and posterolateral margin of coxae IV forming large obtuse angle. Genital plates longer than wide, more or less triangular with 3 acetabula and 9–16 short and fine setae each, genital opening longer than genital plates, anterior genital sclerite 2–3 times wider than posterior one. Pedipalpal genu usually with 3(2) setae, external lateral seta long and located near distal end of segment; pedipalpal tibia with short distolateral spine (3 times shorter than tarsus), 2 ventral and several dorsal setae and a single dorsoproximal spine; both ventral setae located near the middle of tibia on small tubercles.

Male. Coxal plates IV greatly expanded, touching each other posteromedially, medial margin of coxal plate IV 2.5–2.8 times longer than medial margin of coxal plate III, posteromedial margins of coxal plate IV oblique, directed posterolaterally, genital bay shallow, most of genital field lying outside genital bay. Genu IV expanded dorsoventrally, with distinctly convex dorsal margin and weakly convex ventral one, bearing numerous dorsal and ventral setae, and several relatively short sword-like setae; dorsal setae arranged in two groups: proximal group with several relatively short setae, distal group with several long



Figs 71–74. *Tiphys scaurus*, female: 71 — chelicera, 72 — pedipalp, 73 — genu, tibia and tarsus of leg IV, 74 — claw. Scale bars: 71–73 = 100, 74 = 50.

whip-like setae and with rather numerous flat and wide setae, the latter ones shorter than the whip-like setae. Claws of legs III asymmetric, but more or less subequal in size with massive external and internal denticles and thin spur between them each.

Deutonymph. Dorsum with well developed anteromedial plates only; medial margin of coxae IV slightly longer than medial margin of coxae III, posteromedial angle of coxae IV moderately developed, with short apodeme. Genital plates with more or less parallel anterior and posterior margins, postgenital sclerite considerably larger than pregenital sclerite, excretory pore unsclerotized. Pedipalpal femur with 3 dorsodistal setae; genu with 2 setae, external lateral seta 3–4 times longer than dorsodistal seta, base of external lateral seta situated distally to middle of segment; tibia with rather large distolateral spine (0.45–0.70 of tarsus length), ventral setae situated close to each other, on small tubercles distally to middle of segment.

Larva. Dorsal shield elongate (ratio length/width 1.4–1.6). Setae *Fch* and *Vi* slightly longer than *Fp* and *Oi*. Seta *C1* shorter than setae *C2–C4*, which approximately equal in length; bases of setae *C4* on coxal plate III located near medial end

of suture line between coxal plates II and III. Transverse muscle attachment scar absent. Setae *Ci* long and thicker than all ventral idiosomal setae, situated on small bases; setae *Si* shortest. Dorsal shield and coxal plates I–III with cell-shaped reticulations. Excretory pore plate more or less circular, ratio length/width = 0.8–1.1, setae *Ai* shorter than *Ae*, excretory pore located in centre of excretory pore plate. Solenidion on genu I slightly longer than solenidia on tibia I, latter ones subequal in length; proximal solenidion on tibia II twice shorter than distal one, solenidion on genu II shorter than distal solenidion on tibia II.

Description. Female. Body oval; setae *Fch* long, whip-like (Fig. 62), other idiosomal setae filiform. Integument soft with very fine strips. Dorsum with relatively large anteromedial plates, small anterolateral (Fig. 63) and posteromedial platelets (Fig. 64). Coxal plate I usually with 4 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 2–3 lateral thin setae (Fig. 65). Apodeme of coxal plate I moderately developed and usually not extending beyond medial margin of coxal plate III. Suture line between coxal plates III and IV slightly oblique, directed posteromedially. Medial margin of coxal plate IV longer than me-

dial margin of coxal plate III. Posteromedial margin and posterolateral margin of coxae IV forming large obtuse angle with distinct apodeme. Sclerites, bearing setae *Hv*, *Pe* and other idiosomal ventral setae, lying free in soft integument. Four pairs of small unequal platelets present along lateral margins of coxal plates II–IV.

Genital plates more or less triangular (Figs 66–69) with 3 acetabula and 9–16 short, fine setae each. All acetabula approximately subequal in size, second and third acetabula closely together and form more or less right transverse row in posterior portion of genital plate; distance between first acetabulum and third acetabulum larger than distance between second and third acetabula. Anterior ends of genital plates usually more or less pointed, but sometimes anterior end rounded (Fig. 68). Genital opening longer than genital plates, anterior genital sclerite 2–3 times wider than posterior one. Excretory pore with small anterior sclerite (Fig. 70). Capitulum with short anchoral projection, both pairs of setae equal in length. The basal segment of chelicera (Fig. 71) with large dorsal hump, cheliceral stylet relatively large, pointed.

Pedipalp rather stout (Fig. 72). Pedipalpal trochanter with single short dorsodistal seta, femur with 3–4 short proximal setae and 2 dorsodistal ones. Ventral margin of femur straight, ventral margin of genu concave. Pedipalpal genu usually with 3(2) setae (proximal dorsal seta sometimes absent), external lateral seta longer than two other setae; base of external lateral seta situated near distal end of segment. Pedipalpal tibia slender with short distolateral peg-like seta, 2 ventral setae and several dorsal ones; both ventral setae inserted on small tubercles distally, distolateral peg-like seta approximately 3 times longer than tarsus. Pedipalpal tarsus with long proximal solenidion, 5 thin setae and 4 short and thick unequal distal setae.

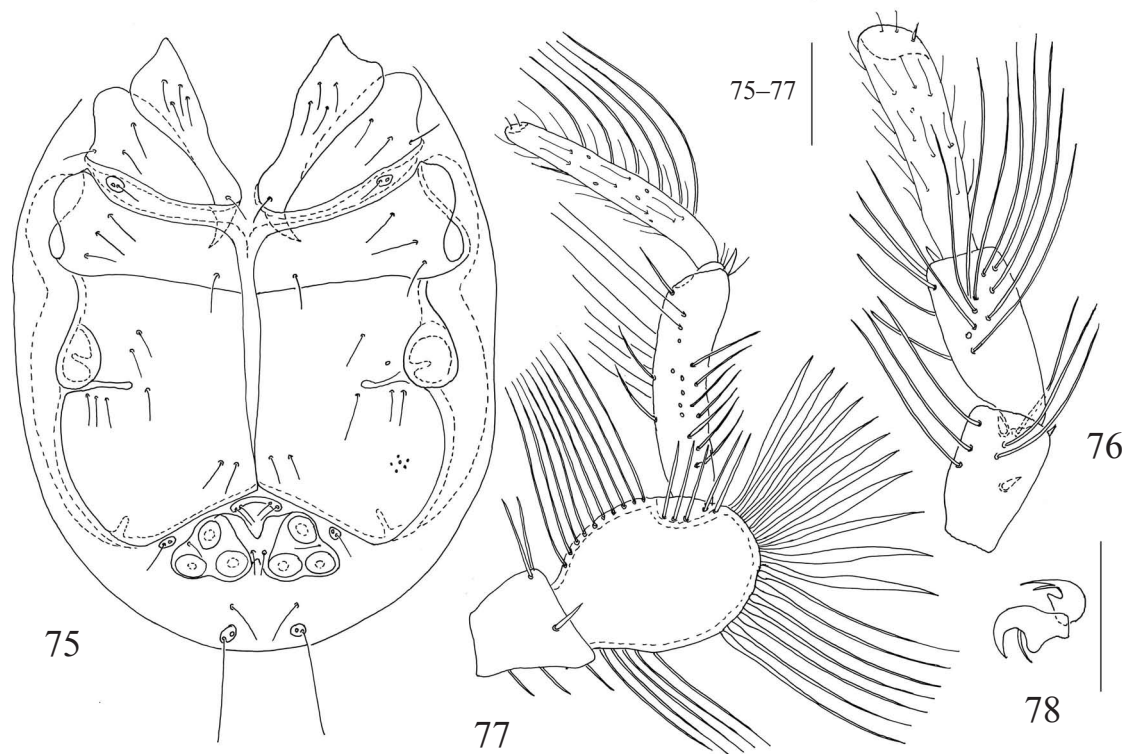
All legs with swimming setae; two anterior pairs of legs with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 73). One swimming seta present on genu I, 2 on tibia I and genu II, 2–3 on genu III and tibia II, 3–4 on genu III and IV, 5–8 on tibia III and IV. Claws of legs I–III larger than claws of legs IV; both denticles pointed and approximately subequal in length, but internal denticle slightly wider than external one (Fig. 74). Claw lamella moderately developed with convex ventral margin.

Measurements (n=10). Length of body 800–940, length of medial margin of coxa III 54–60,

length of medial margin of coxa IV 70–85; length of anteromedial dorsal plates 48–60, width 15–24; length of genital plates 130–140, width 50–80; length/width of genital acetabula (*ac.* 1–3): 36–42/24–30, 36–42/24–30, 36–45/25–30; width of anterior genital sclerite 95–125; length of basal segment of the chelicera 130–140, length of cheliceral stylet 55–60; length of pedipalpal segment (P-1–5): 30–40, 105–125, 70–82, 120–140, 55–58; length of distolateral spine on tibia 18; length of leg segments: I–Leg. 1–6: 65–82, 95–115, 130–145, 175–195, 195–205, 200–220; II–Leg. 1–6: 70–82, 105–115, 135–150, 175–195, 195–215, 200–230; III–Leg. 1–6: 80–83, 110–125, 130–140, 170–190, 210–220, 200–230; IV–Leg. 1–6: 120–130, 130–150, 170–190, 235–255, 260–280, 250–260.

Male. Dorsal surface, coxae I–III similar to those in female. Anterior apodemes rather large, extending posteriorly to medial edge of coxal plate III; posterior apodemes little developed (Fig. 75). Coxae plates IV greatly expanded, touching each other posteromedially, with 2 short and fine setae on each side of this area, situated rather close to each other; interspace between posterior coxal groups sclerotized. Medial margin of coxal plate IV 2.5–3.0 times longer than medial margin of coxal plate III. Suture line between coxal plates III and IV nearly transverse. Posteromedial margins of coxal plate IV oblique, directed posterolaterally, and forming a shallow bay partially surrounding external genital organ; lateral margins of these coxal plates convex. Genital plates triangular and fused to each other medially, all acetabula relatively large, approximately subequal in size, and arranged in triangle. Anterior genital sclerite small, curved, with 2 pairs of short and fine setae, sometimes it fused with genital plates. Genital plates with 2–3 short and fine setae each. Sclerites bearing setae *Hv* close to posterior margin of coxae II; other sclerites bearing ventral idiosomal setae lying free in soft integument. Excretory pore with small anterior sclerite. Capitulum, chelicera and pedipalps similar to female, but pedipalpal tibia with more numerous dorsal setae.

Genu III (Fig. 76) shorter than tibia III, and tarsus III considerably longer than tibia III; genu III with 5–6 rather long distal setae, tibia III with 6–9 long swimming setae, and tarsus III with numerous short thin setae. Telofemur of leg IV (Fig. 77) short, expanded distally; genu IV large, narrowed proximally, expanded dorsoventrally with convex dorsal and ventral margin, bearing numer-



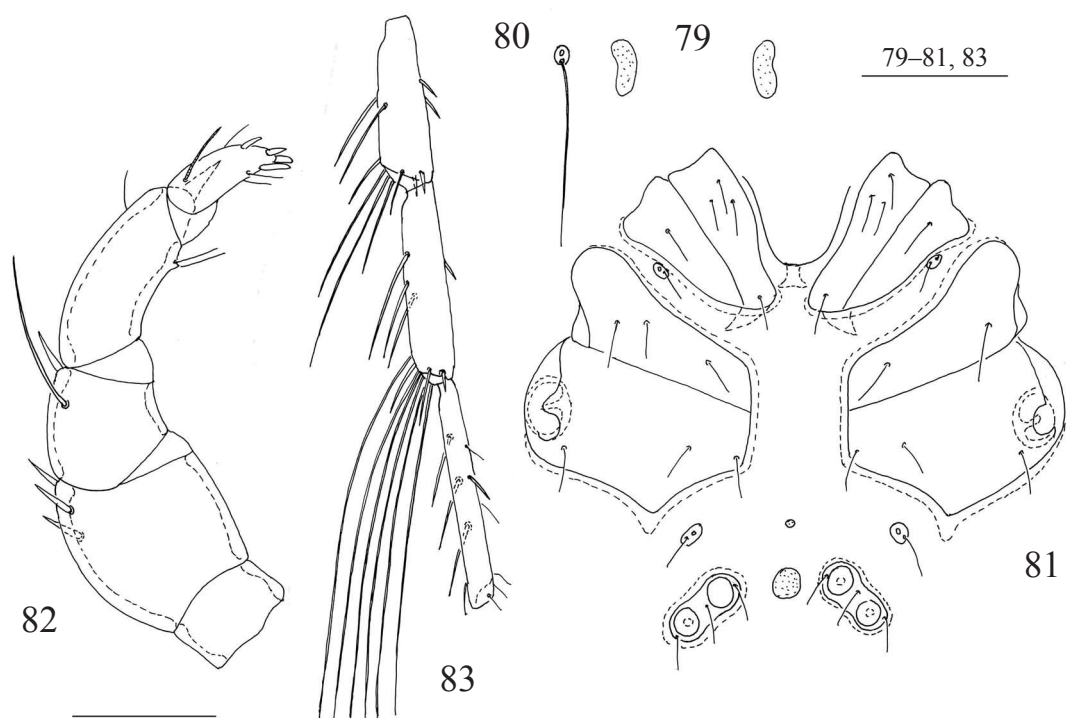
Figs 75–78. *Tiphys scaurus*, male: 75 — ventral view, 76 — genu, tibia and tarsus of leg III, 77 — telofemur, genu, tibia and tarsus of leg IV, 78 — claws of leg III. Scale bars: 75–77 = 100, 78 = 50.

ous dorsal and ventral setae and several relatively short distal ones; dorsal setae arranged in two groups: proximal group with several relatively short setae, distal group with several long whip-like setae and with a few sword-like setae; latter setae shorter than whip-like ones. Tibia IV slightly curved with concave dorsal and convex ventral sides with numerous unequal setae and a single short, thick dorsodistal peg-like seta. Tarsus of leg IV slender, slightly tapering distally with numerous short and fine setae, and 3–6 unequal long swimming setae. Claw of legs I and II similar to those in female. Claws of legs III (Fig. 78) asymmetric; large claw with thick external denticle and thin internal one; small claw with thin pointed unequal denticles.

Measurements (n=7). Body length 570–615, length of medial margin of coxa III 70–75, length of medial margin of coxa IV 180–200; length of anteromedial dorsal plates 36–42, their width 15–24, length of genital plates 65–72, their general width 160–180; length/width of genital acetabula (*ac.* 1–3): 36–42/24–30, 42–45/30–36, 30–36/24–36; length of basal segment of the chelicera 120–125; length of cheliceral stylet 48–57; length of pedipalpal segment (P-1–5): 30–33, 90–105, 45–65, 45–50; length of distolateral peg-like spine on tibia 15–18; length of leg segments: I–Leg.

1–6: 55–65, 90–100, 105–115, 140–155, 150–165, 210–220; II–Leg. 1–6: 65–75, 95–105, 105–125, 135–155, 150–165, 200–230; III–Leg. 1–6: 73–90, 90–100, 70–90, 85–100, 115–130, 170–190; IV–Leg. 1–6: 120–130, 95–115, 85–95, 160–180, 220–245, 220–230.

Deutonymph. Similar to female, but smaller. Dorsum with well developed anteromedial plates only (Fig. 79). Setae *Fch* long, thin (Fig. 80). Coxal plate I usually with 3 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 1 lateral thin setae, coxal plate III with 1 medial seta and 1–2 lateral thin setae, coxal plate IV with 2 medial seta and 1 lateral seta (Fig. 81). Apodeme of coxal plate I short and not extending beyond medial margin of coxal plate III. Suture line between coxal plates III and IV oblique, directed posteromedially. Medial margin of coxae IV slightly longer than medial margin of coxae III. Posteromedial angle of coxae IV moderately developed with short apodeme. Sclerite bearing seta *Hv* located near posterior margin of coxal plate II, other ventral idiosomal setae situated on soft integument. Genital plates separated, oblique, directed anteromedially, with more or less parallel anterior and posterior margins, bearing 2 acetabula and 3 short and fine setae each. Both acetabula approximately subequal in size, distance between



Figs 79–83. *Tiphys scaurus*, deutonymph: 79 — anterior dorsal plates, 80 — seta Fch, 81 — ventral view, 82 — pedipalp, 83 — genu, tibia and tarsus of leg IV. Scale bars: 79–81, 83 = 100, 82 = 50.

them usually less than diameter of one acetabulum on each plate. Postgenital sclerite considerably larger than pregenital sclerite. Excretory pore non-sclerotized.

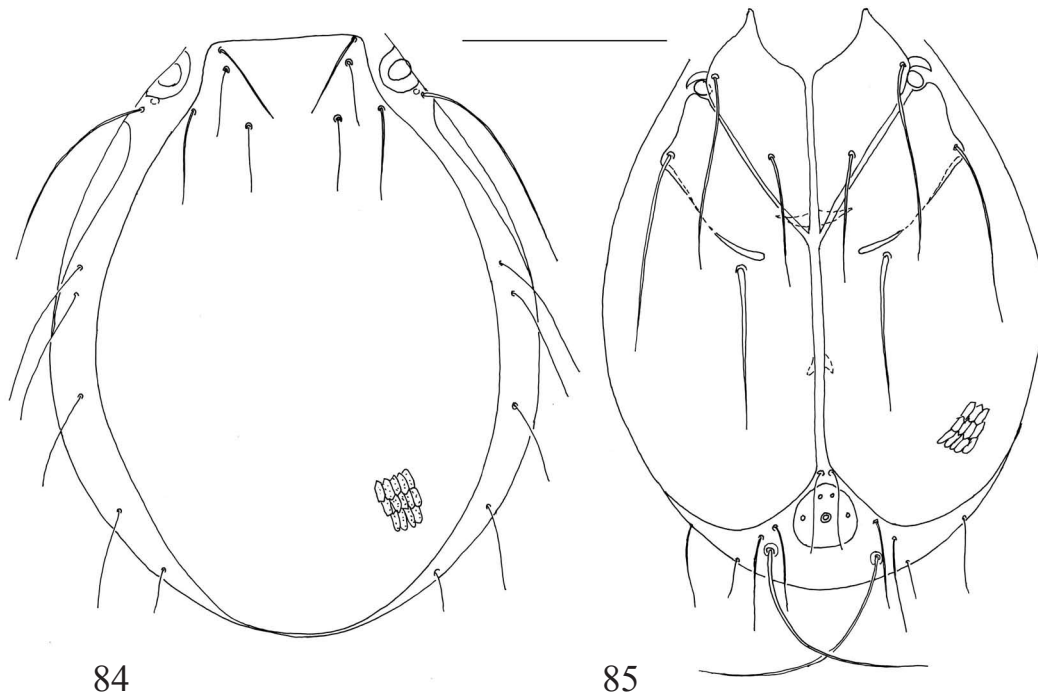
Pedipalpal trochanter (Fig. 82) without setae, femur with 3 dorsodistal setae. Ventral margin of femur straight or slightly convex, ventral margin of genu concave. Pedipalpal genu with 2 setae, external lateral seta 3–4 times longer than dorsodistal seta; base of external lateral seta inserted distally to middle of segment. Pedipalpal tibia with rather long distolateral peg-like spine, 2 ventral setae and 1–2 dorsodistal ones. Both ventral setae situated closely to each other and inserted on very small tubercles in distal half of tibia. Length of distolateral spine of tibia 0.45–0.70 of tarsus length. Pedipalpal tarsus with single long proximal solenidion, 3 thin setae and 4 thick distal spines.

All legs with swimming setae; two anterior pairs of legs with short swimming setae, two posterior pairs of legs with long swimming setae (Fig. 83). One swimming seta present on tibia I, 2 on tibia II and genu II–IV, 3–4 on tibia III, 4–5 on tibia IV. Claws of legs I–III larger, than claws of legs IV. Internal denticle of claw of legs I–III rather wide with rounded tip, external denticle thin and pointed.

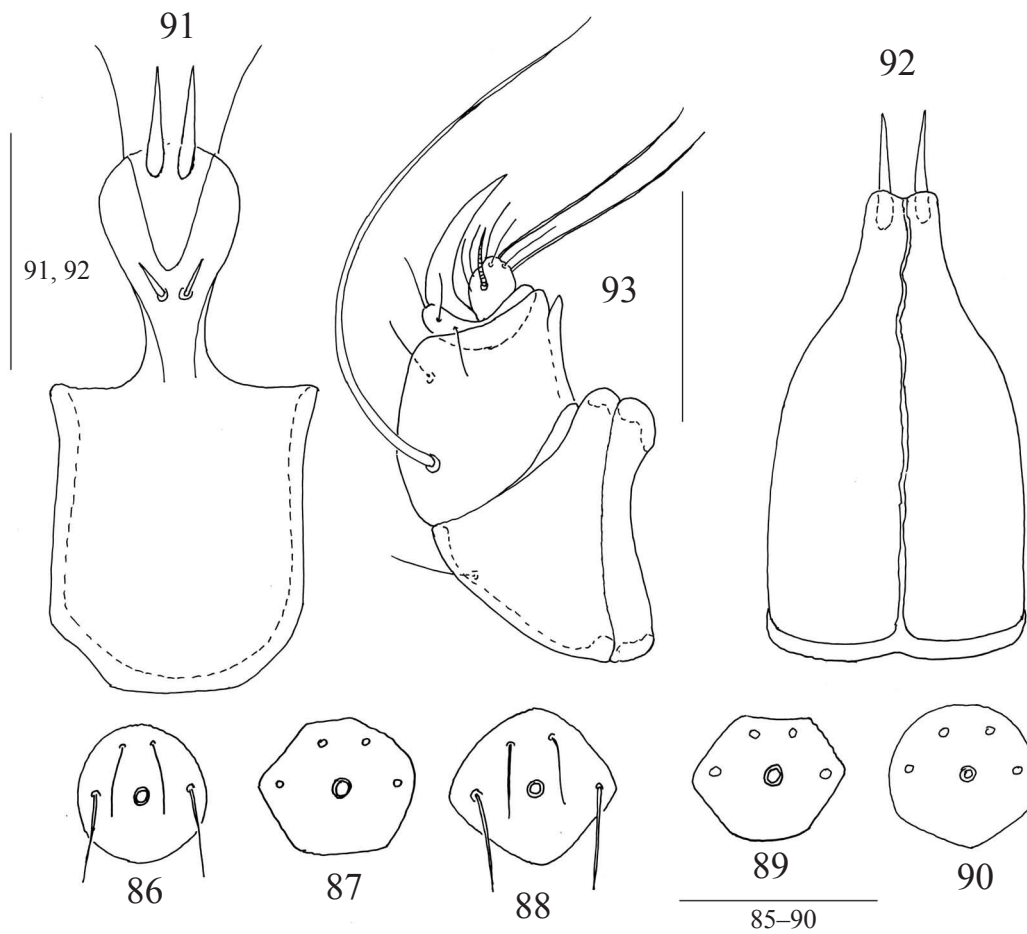
Measurements (n=3). Body length 80–540, length of medial margin of coxa III 24–30, length

of medial margin of coxa IV 30–35; length of anteromedial dorsal plates 30–35, width 12–14, length of genital plates 57–65, width 32–35; diameter of genital acetabula (*ac.* 1–2): 16–19, 16–18; length of basal segment of chelicera 97–100, length of cheliceral stylet 30–35; length of pedipalpal segment (P-1–5): 23–25, 55–65, 30–35, 55–60, 25–30; length of distolateral spine on tibia 15–18; length of leg segments: I–Leg. 1–6: 40–45, 55–60, 58–65, 90–95, 100–105, 120–125; II–Leg. 1–6: 45–50, 55–60, 60–65, 95–105, 110–115, 130–135; III–Leg. 1–6: 50–55, 60–65, 60–65, 100–105, 115–125, 130–135; IV–Leg. 1–6: 60–65, 65–70, 75–80, 105–115, 125–135, 145–150.

Larva. Body small and oval; dorsal shield truncated anteriorly, rounded posteriorly, slightly indented anterolaterally near anterior eyes, with convex lateral margins (Fig. 84). Dorsal shield elongate (ratio length/width 1.4–1.6), covering almost all dorsum in unengorged larva and bearing 4 pairs of setae (*Fch*, *Fp*, *Vi*, *Oi*). Setae *Fch* and *Vi* slightly longer than *Fp* and *Oi*. Setae *Oe*, *Hi*, *He*, *Sci*, *Sce* and *Li* located on the soft and wrinkled membrane. Setae *Oe* longest and thickest of all dorsal setae, setae *Li* shorter than other dorsal setae. Lateral sides of coxae II+III expanding onto dorsal side and lying beside setae *Oe* and other hysterosomal setae located on interscutal membrane. Dorsal shield with cell-shaped reticulations.

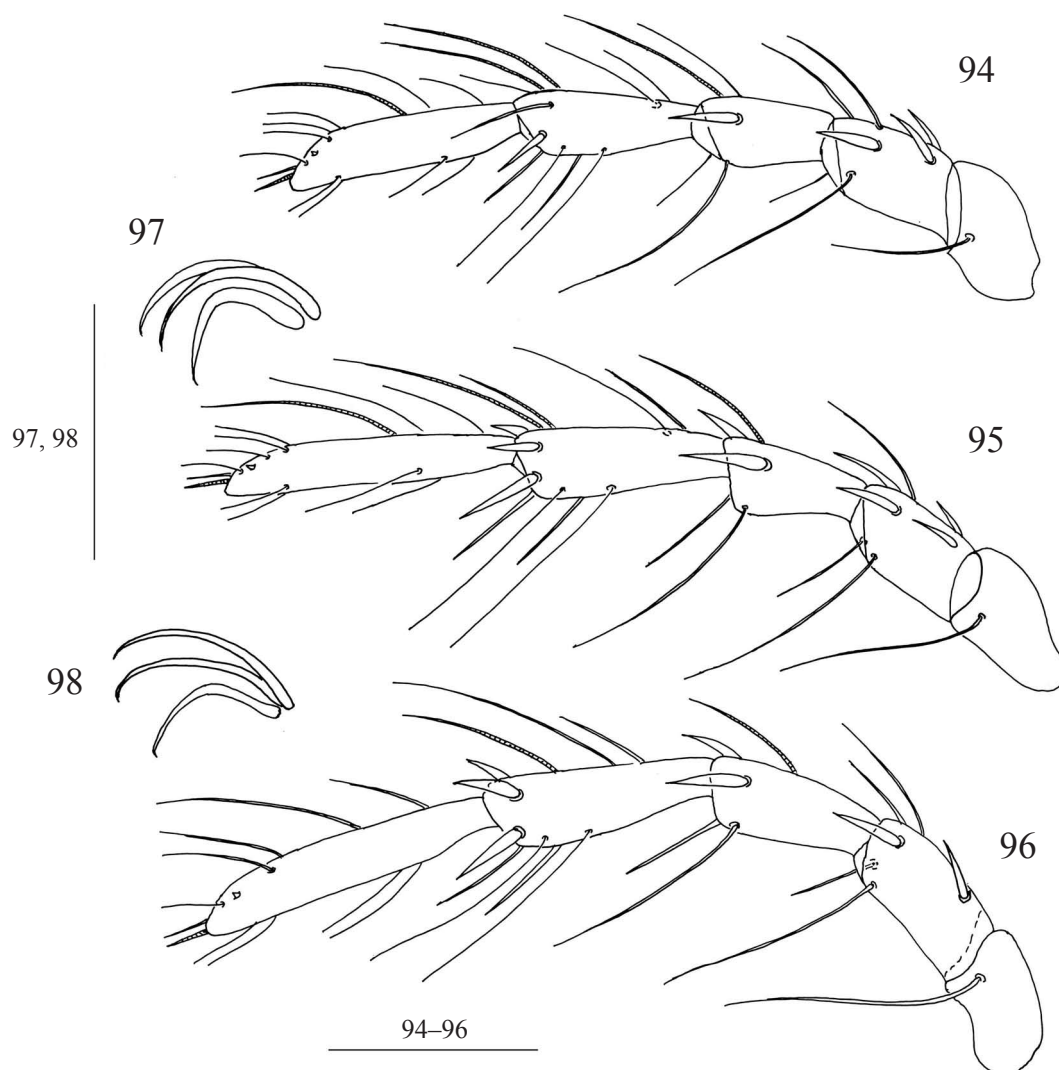


Figs 84–85. *Tiphys scaurus*, larva: 84 — dorsal view, 85 — ventral view. Scale bar: 84–85 = 100.



Figs 86–93. *Tiphys scaurus*, larva: 86–90 — excretory pore plate, 91 — capitulum (ventral view), 92 — chelicerae, 93 — pedipalp. Scale bars: 86–90 = 50; 91, 93 = 30, 92 = 35.

Coxal plates I–II relatively small; anterior coxal plates separated from coxal plates II and III, which are fused, suture line between them incomplete and developed only in their lateral parts (Fig.



Figs 94–98. *Tiphys scaurus*, larva: 94 — leg I, 95 — leg II, 96 — leg III, 97 — claws of leg I, 98 — claws of leg III. Scale bars: 94–96 = 50, 97–98 = 25.

85). Anterior margin of coxal plates I concave and considerably shorter than posterior margin. Setae C1 shorter than setae C2–C4, which approximately equal in length. Bases of setae C4 on coxal plate III located near medial end of suture line between coxal plates II and III. Posteromedial apodemes of coxal plates I well developed, apodemes of coxal plates II absent, and apodemes of coxal plates III poorly developed. Transverse muscle attachment scar not developed in the posteromedial angles of coxal plates III. Setae *Ci*, *Si*, *Se*, *Le*, *Pi*, *Pe* situated on soft interscutal membrane in posterior part of body. Setae *Ci* longer and thicker than all ventral idiosomal setae, and situated on small bases; setae *Si* shortest and thin. Coxal plates I–III with developed cell-shaped reticulations. Urstigma occupying lateral position on border between coxae I and II and provided cup.

Shape of excretory pore plate highly variable (Figs 86–90), ratio length/width = 0.8–1.1. Setae

Ai located in front of setae *Ae*, latter ones longer than setae *Ai*. Excretory pore open near midlength of excretory pore plate.

Capitulum elongate (Fig. 91), capitular base relatively narrow with rounded or straight posterior edge, anterior hypostomal setae longer and thinner than posterior ones. Basal segments of chelicerae (Fig. 92) fused by their medial parts and tapering proximally; suture line well developed along their whole length. Cheliceral stylet small and crescent in shape.

Pedipalp trochanter (Fig. 93) short and without setae; dorsodistal setae of femur and genu of pedipalps short, approximately equal in size, proximal lateral genual seta thick and very long; tibia with 3 short approximately subequal setae, and large dorsodistal claw. Pedipalpal tarsus with 1 short solenidion, 2 long setae and 5 unequal simple ones.

The general number of setae on legs I–III (Figs 94–96), except eupathidia, is as follows: I-

Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); II–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5: 1, 6, 5(s), 10 (s), 11 (ac). Formula of large setae on leg segments as follows: I–Leg 1–5: 0, 3, 1, 1, 0; II–Leg 1–5: 0, 4, 2, 3, 0; III–Leg 1–6: 0, 3, 2, 3, 0. Solenidia on genu, tibia and tarsus of leg I approximately subequal in length; proximal solenidion on tibia II twice shorter than distal one, solenidion on genu II shorter than distal solenidion on tibia II; solenidion on genu of leg III shorter than solenidion on tibia III. Central claw and lateral claws of all legs almost subequal in size; on tarsi of legs I and II central claw bending at right angle and ambulacra only slightly bent (Fig. 97); central claw of tarsus III turned onto ventral side at obtuse angle (Fig. 98).

Measurements (n=10). Length of dorsal shield 260–280, its width 170–180; length of excretory pore plate 30–36, width 30–36; length of capitulum 70–75; length of basal segment of chelicera 60–68, length of chelicera stylet 12–14; length of medial margin of coxae I 70–80, length of medial margin of the coxae II+III 120–130; length of pedipalpal segments (P-1–5): 6–8, 26–30, 20–22, 7–8, 6–7; length of legs segments: I–Leg. 1–5: 32–36, 32–34, 30–32, 42–44, 60–64; II–Leg. 1–5: 34–36, 32–36, 30–32, 50–52, 72–76; III–Leg. 1–5: 35–40, 36–40, 38–40, 54–58, 73–78.

Remarks. The morphology of the European larva of *T. scaurus* differs from larva of this species described from Canada in the following characters (characters states of the Canadian larva *T. scaurus* are indicated in parentheses, data after Smith 1976): transverse muscle attachment scar is absent (present); base of seta C4 on coxal plate III and the medial end of suture line between coxal plates II and III are separated (close to each other); length of dorsal plate 260–280 (227–243), width of dorsal plate 170–180 (147–156), length of excretory pore plate 30–36 (27–30), width of anal plate 30–36 (27–32).

Unfortunately, Smith (1976) did not give characteristics of the *T. scaurus* female from North America and cited the data of Cook (1956); the latter author gave only brief characteristics of *T. scaurus* female received from The Netherlands. It is possible, that North American specimens should be treated as a subspecies of *T. scaurus* or even a distinct species.

Ecology. Temporary ponds, sedge-sphagnum bogs, streams with macrophytes which are subject to periodic drying, but occurs also in permanent waters.

Geographical distribution. Europe, Asia, USA(?) (Sokolow 1940; Viets 1956; Cook 1956; Lundblad 1968; K.O. Viets 1978).

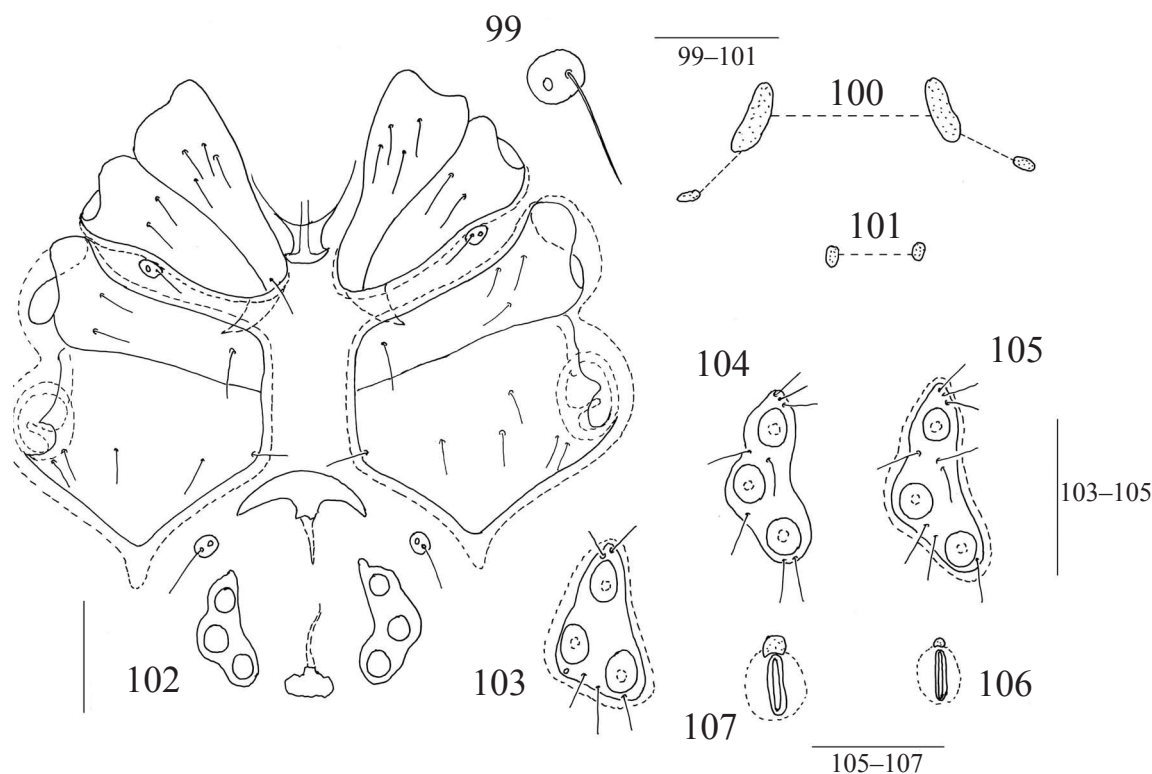
***Tiphys (Tiphys) scaurellus* Tuzovskij, 1983**

Figs 99–135

Material. Holotype male (IBIW 2567): Asia, Russia, Magadan Province, Tenka Distr., village Agrobasa, sedge-sphagnum bog near village, 8 July 1979, P.V. Tuzovsky. Paratypes: 5 females, 3 males, 1 deutonymph and 5 larvae reared in laboratory (IBIW): Russia, Magadan Province, Tenka Distr., village Agrobasa, sedge-sphagnum bogs June–July 1979, P.V. Tuzovsky. Additional material: 13 females, 12 males, 4 deutonymphs and 29 larvae reared in laboratory (IBIW): Asia, Russia: Magadan Province, Anadyr Distr., Markovo: sedge-sphagnum bog on the left bank of the Anadyr river, 5 km upstream of the settlement, July 1978, P.V. Tuzovsky; 3 females, 4 males and 4 deutonymphs: Kamchatka Province, Ust'-Kamchatsk Distr., sedge-sphagnum bog on right bank of the Kamchatka river, 40 km upstream from Ust'-Kamchatsk city, 18 July 1983, P.V. Tuzovsky; 1 female and 1 male, Europe, Russia: Arkhangelsk Province, Vaigach island, peat-bog, 13 July 2004, O.L. Makarova.

Diagnosis. Female. Medial margin of coxal plate IV 1.3–1.6 times as long as medial margin of coxal plate III, posteromedial margin and posterolateral margin of coxae IV forming obtuse angle. Sclerites bearing setae *Hv* fused with posterior margin of coxal plate II; sclerites bearing other idiosomal setae lying free in soft integument. Genital plates more or less triangular with 3 acetabula and 8–10 short and fine setae each; all acetabula small, approximately subequal in size, and usually arranged in an arc. Pedipalp slender, genu with 2 setae, external lateral seta considerably longer than dorsodistal seta, base of external lateral seta situated near middle of segment. Pedipalpal tibia with short distolateral spine (3–4 times shorter than tarsus), both ventral setae situated on small tubercles distally to middle of segment.

Male. Coxae plates IV greatly expanded, touching each other posteromedially; medial margin of coxal plate IV 3–4 times longer than medial margin of coxal plate III; suture line between coxal plates III and IV transverse. Posteromedial margins of coxal plate IV oblique, directed posterolaterally, and forming a deep bay almost completely enclosing genital field. Sclerites bearing setae *Hv* fused with posterior margin of coxae II; other sc-



Figs 99–107. *Tiphys scaurellus*, female: 99 — seta *Fch*, 100 — anteromedial and anterolateral dorsal plates, 101 — posteromedial dorsal plates, 102 — ventral view, 103–105 — genital plates, 106–107 — excretory pore. Scale bars: 99–101 = 50, 102–107 = 100.

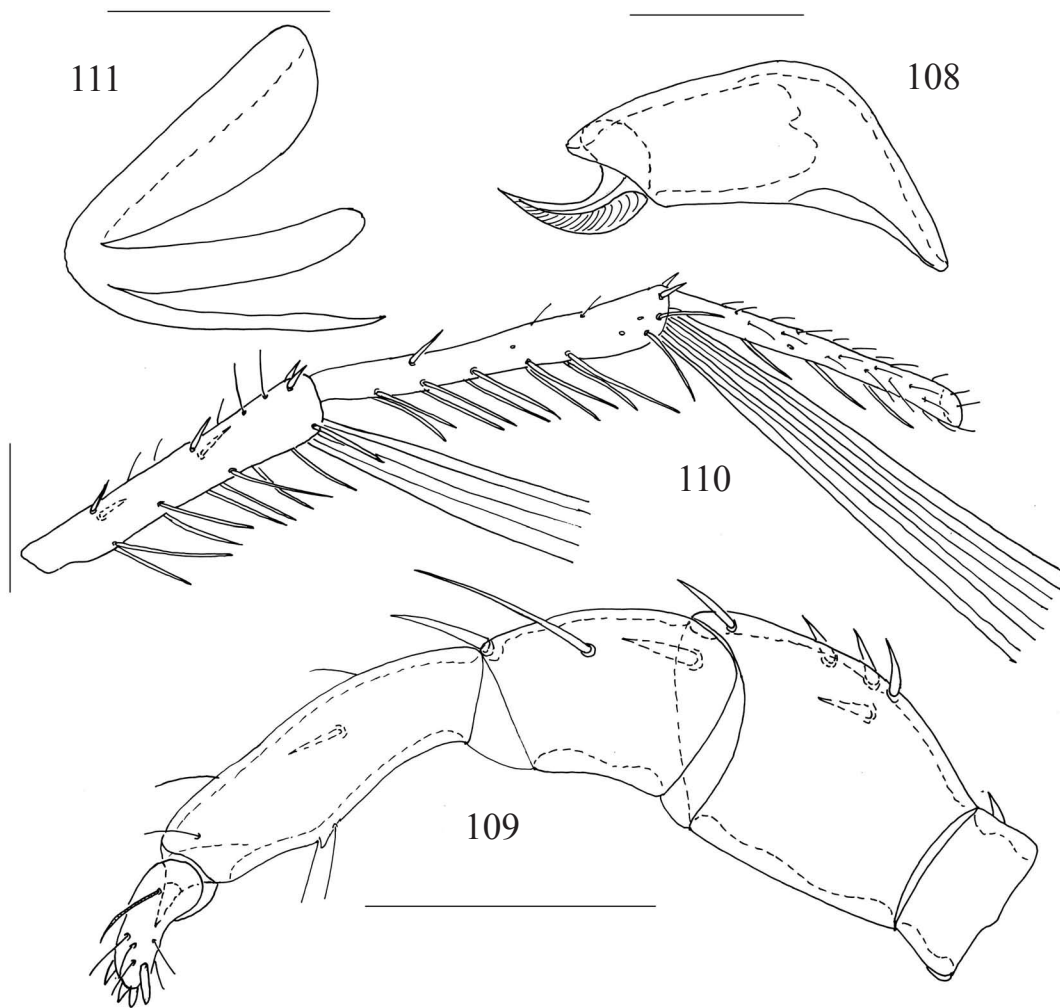
lerites bearing ventral idiosomal setae lying free in soft integument. Genu IV expanded dorsoventrally with almost straight dorsal margin and convex ventral one, dorsal setae arranged in two groups: proximal group with several relatively short setae, and distal group with numerous long, thick setae. Claws of legs III asymmetrical, large claw with two long approximately subequal denticles; small claw with long external denticle and short internal one, external denticle with short, thin ventral spur.

Deutonymph. Dorsum with well developed anteromedial plates only, setae *Fch* relatively short and thin. Medial margin of coxae IV 1.0–1.2 times longer than medial margin of coxae III. Posteromedial angle of coxae IV moderately developed. Sclerites bearing setae *Hv* fused with posterior margins of coxae II, other ventral idiosomal setae lying free in soft integument. Genital plates separated, slightly oblique, directed anteromedially, both acetabula approximately subequal in size, distance between them usually equal to diameter of acetabulum on each plate. Postgenital sclerite considerably larger than pregenital sclerite. Pedipalpal femur with 3 dorsodistal setae; genu with 2 setae, external lateral seta approximately twice as long as dorsodistal seta; base of external lateral seta located near middle of segment. Pedipalpal

tibia with rather a long distolateral seta (0.45–0.55 of tarsal length), both ventral setae situated in distal half tibia on very small tubercles.

Larva. Body small and nearly circular in shape; dorsal shield convex and slightly elongate (ratio length/width 1.15–1.20), setae *Fch* and *Vi* slightly longer and thicker than *Fp* and *Oi*. Setae *Oe* longest and thickest of all dorsal setae, setae *Li* shorter than other dorsal setae. Setae C1 and C4 considerably shorter than setae C2–C3, which approximately equal in length. Base of setae C4 on coxal plate III and medial end of suture line between coxal plates II and III well separated. Dorsal shield and coxal plates I–III with reticulations. Excretory pore plate oval or nearly circular (ratio length/width = 0.9–1.1), excretory pore placed between rows of setae *Ai* and *Ae* in anterior half of anal plate. Solenidia on genua and tibiae I–III relatively short; solenidion on genu I not longer than distal solenidion on tibia I; proximal solenidion on tibia I and II slightly shorter than distal one, solenidion on genu II slightly shorter than distal solenidion on tibia II.

Description. Female. Body oval; setae *Fch* long, whip-like (Fig. 99), other idiosomal setae filiform. Dorsum with relatively large anteromedial, small anterolateral, and small posteromedial platelets (Figs 100–101). Anteromedial plates rel-



Figs 108–111. *Tiphys scaurellus*, female: 108 — chelicera, 109 — pedipalp, 110 — genu, tibia and tarsus of leg IV, 111 — claw. Scale bars: 108–110 = 100, 111 = 50.

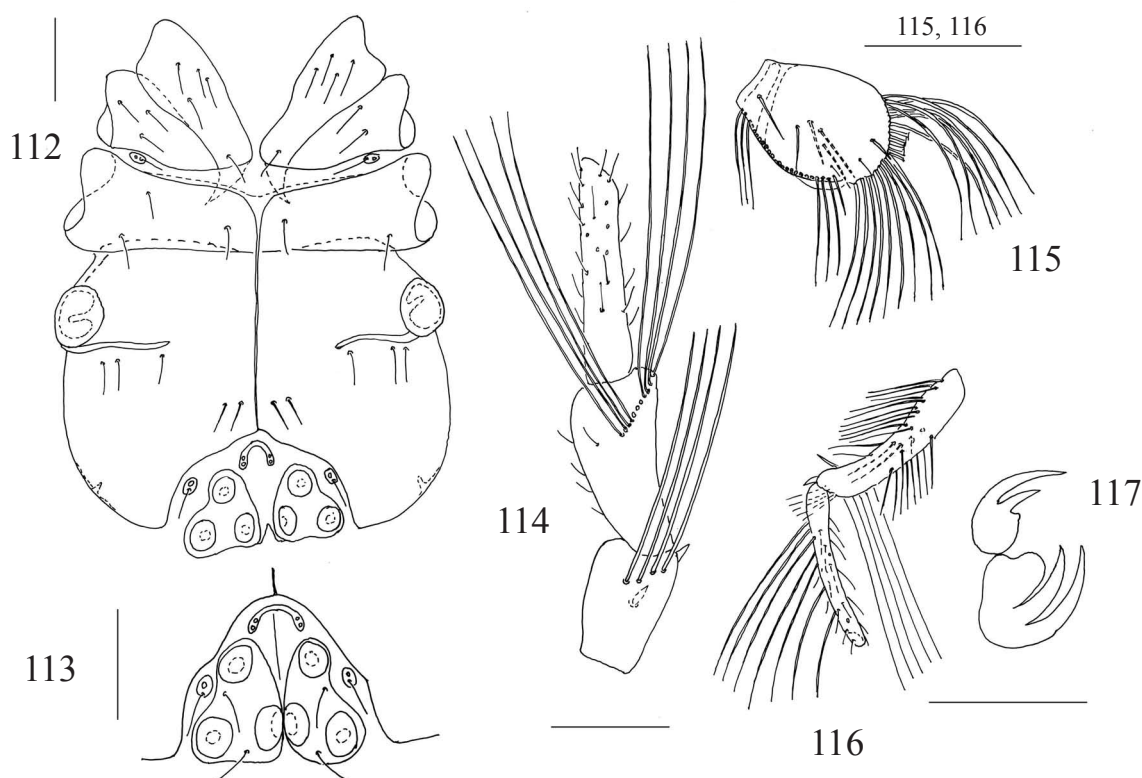
atively large and elongate, anteromedial and posteromedial platelets oval or almost circular; sometimes anterolateral platelets not developed. Coxal plate I usually with 4 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 2–3 lateral thin setae (Fig. 102). Apodeme beneath posteromedial edge of coxal plate I moderately developed, not reaching or slightly extending beyond anterior edge of coxal plate III. Suture line between coxal plates III and IV complete and oblique, directed posteromedially. Medial margin of coxal plate IV 1.3–1.6 times longer than medial margin of coxal plate III. Posteromedial margin and posterolateral margin of coxae IV forming right or obtuse angle. Sclerites bearing setae *Hv* close to or fused with posterior margin of coxal plate II; sclerites, bearing other idiosomal setae, lying free in soft integument.

Genital plates elongate and more or less triangular (Figs 103–105), with 3 acetabula and 8–10 short and fine setae each. All acetabula small, ap-

proximately subequal in size, and usually arranged in an arc or obtuse triangle; acetabula relatively small and occupy less than half surface of genital plate. Genital opening longer than genital plates, anterior genital sclerite considerably wider than posterior one. Excretory pore with very small anterior sclerite (Figs 106–107).

Capitulum with short anchoral projection, both pairs of setae equal in length. Basal segment of chelicera (Fig. 108) large, with strong convex dorsal margin and nearly straight ventral one. Cheliceral stylet moderately developed, pointed.

Pedipalps (Fig. 109) rather slender. Pedipalpal trochanter with single short dorsodistal seta, femur with 3–4 proximal and 2 short dorsodistal setae. Ventral margin of femur straight, ventral margin of genu concave. Pedipalpal genu with 2 setae, external lateral seta considerably longer than dorsodistal seta; base of external lateral seta situated distally to middle of segment. Pedipalpal tibia relatively thin, slender, with short distolateral



Figs 112–117. *Tiphys scaurellus*, male: 112 — ventral view, 113 — genital field, 114 — genu, tibia and tarsus of leg III, 115 — genu of leg IV, 116 — tibia and tarsus of leg IV, 117 — claws of leg III. Scale bars: 112–114 = 100, 115–116 = 250, 117 = 50.

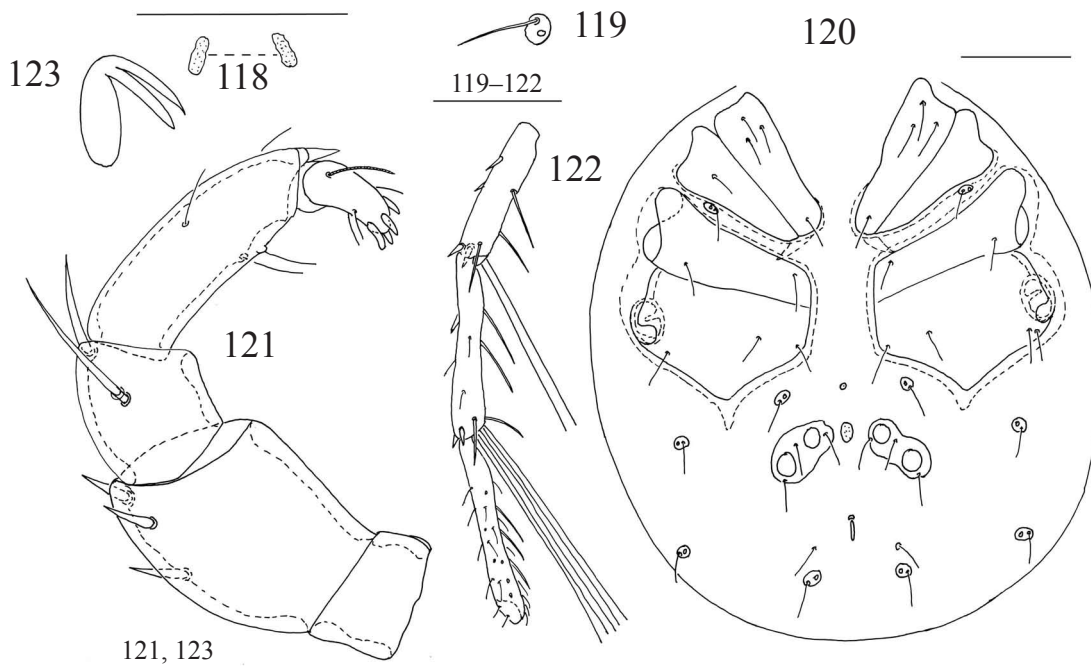
peg-like spine, 2 ventral and several fine dorsal setae and 1 spine proximally to middle of segment. Both ventral setae inserted distally to middle of tibia on small tubercles. Distolateral spine of tibia 3–4 times shorter than tarsus. Pedipalpal tarsus with long proximal solenidion, 5 thin setae and 4 thick unequal distal spines.

All legs with swimming setae; two anterior pairs of legs with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 110). One swimming seta present on genu I, 2–3 on tibia I and genu II, 2–4 on genu III, 3–5 on tibia II, 5–7 on genu IV and tibia III and 5–8 on tibia IV. Claws of legs I–III larger than claws of legs IV; both denticles subequal in length (Fig. 111), internal denticle wide with rounded tip, external denticle thin and pointed. Claw lamella moderately developed, with convex ventral margin.

Measurements (n=10). Body length 700–1305, length of medial margin of coxa III 55–75, length of medial margin of coxa IV 80–110; length of anteromedial dorsal plates 45–60, width 20–27, length of genital plates 95–140, width 55–75; diameter of genital acetabula (*ac.* 1–3): 24–27, 24–27, 25–30; width of anterior genital sclerite 115–155; length of basal segment of chelicera 140–170,

length of cheliceral stylet 65–75; length of pedipalpal segment (P-1–5): 40–50, 105–140, 80–100, 120–170, 40–50; length of distolateral spine on tibia 12–16; length of leg segments: I–Leg. 1–6: 70–100, 120–130, 145–195, 200–270, 220–295, 220–305; II–Leg. 1–6: 80–105, 110–165, 150–190, 200–260, 220–280, 225–280; III–Leg. 1–6: 80–115, 115–160, 130–175, 175–230, 220–295, 220–285; IV–Leg. 1–6: 120–165, 145–190, 160–215, 240–310, 275–350, 250–325.

Male. Dorsal surface, coxae of legs I–III similar to those in female. Anterior apodemes rather large, extending beyond anteromedial edge of coxal plate III; posterior apodemes slightly developed (Fig. 112). Coxal plates IV greatly expanded, touching each other along their whole medial margins, with 2 posteromedial fine setae close together on each side. Medial margin of coxal plate IV 3–4 times longer than medial margin of coxal plate III. Suture line between coxal plates III and IV transverse. Posteromedial margins of coxal plate IV concave and forming deep bay almost completely encompassing genital organ; lateral margins of these coxal plates convex. Genital plates triangular, all acetabula approximately subequal in size, and occupy half or lesser surface of plates (Fig. 113). Anterior genital sclerite very small and



Figs 118–123. *Tiphys scaurellus*, deutonymph: 118 — anterior dorsal plates, 119 — seta *Fch*, 120 — ventral view, 121 — pedipalp, 122 — genu, tibia and tarsus of leg IV, 123 — claw. Scale bars: 118–120, 122 = 100; 121, 123 = 50.

curved, with two pairs of short and fine setae; genital plates with 2 short and fine setae each. Sclerites bearing setae *Pe* not fused with posteromedial margin of coxae IV; sclerites bearing setae *Hv* close to posterior margin of coxae II; other sclerites bearing ventral idiosomal setae lying free in soft integument. Excretory pore with small anterior sclerite. Capitulum, chelicerae and pedipalps similar as in female, but pedipalpal tibia with more numerous dorsal setae.

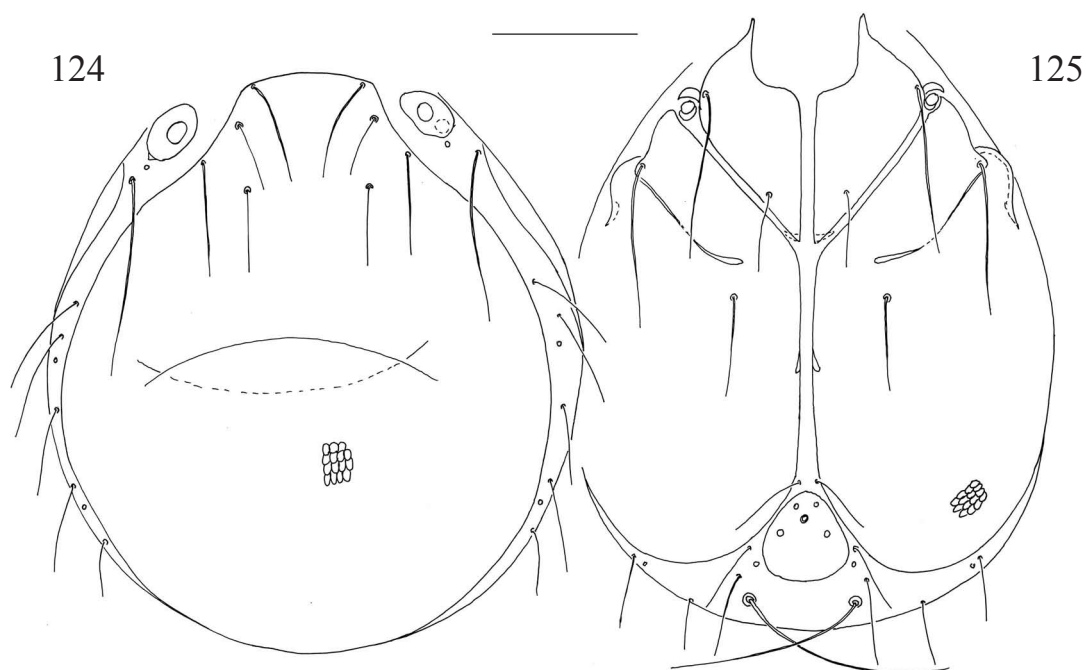
Genu III (Fig. 114) shorter than tibia III, tarsus III slightly tapering distally, tibia and tarsus nearly subequal in length; genu III with 4–5 relatively short swimming setae, tibia III with 10–12 long swimming ones. Genu IV (Fig. 115) expanded distally, with widely rounded distal end, with numerous dorsodistal and ventral setae and a few short setae; dorsodistal setae longer than ventral ones. Tibia IV slightly curved, with concave dorsal margin and convex ventral one, with numerous unequal dorsal and ventral setae and a single peg-like dorsodistal seta, and 5–7 long swimming setae (Fig. 116). Tarsus IV slender, slightly tapering distally, with numerous short and fine setae and 7–9 long unequal swimming setae.

Claw of legs I and II as in female. Claws of legs III (Fig. 117) asymmetrical, large claw with two approximately subequal denticles, small claw with long external denticle and short internal one.

Measurements ($n=10$). Length of body 650–815, length of medial margin of coxa III 65–75,

length of medial margin of coxa IV 250–305; length of anteromedial dorsal plates 40–45, their width 12–18, length of genital plates 90–100, their general width 210–220; length/width of genital acetabula (*ac.* 1–3): 48–55/30–40, 42–48/30–35, 48–60/35–40; length of basal segment of the chelicera 130–145; length of cheliceral stylet 55–58; length of pedipalpal segment (P-1–5): 35–50, 100–122, 55–80, 120–140, 40–42; length of distolateral spine on tibia 12–16; length of leg segments: I-Leg. 1–6: 70–90, 120–140, 135–165, 185–230, 220–255, 240–285; II-Leg. 1–6: 80–100, 110–145, 130–155, 180–205, 180–230, 220–245; III-Leg. 1–6: 95–115, 120–155, 105–125, 150–180, 185–205; IV-Leg. 1–6: 135–165, 120–155, 90–115, 230–270, 260–310, 285–310.

Deutonymph. Similar to female, but smaller. Dorsum with anteromedial plates only (Fig. 118), anteromedial and posteromedial platelets rudimentary or absent. Setae *Fch* relatively short (Fig. 119). Coxal plate I usually with 3 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 1 lateral thin setae, coxal plate III with 1 medial seta and 1–2 lateral thin setae, coxal plate IV with 2 medial seta and 1 lateral seta (Fig. 120). Apodeme of coxal plate I moderately developed, not reaching or slightly extending beyond anteromedial margin of coxal plate III. Suture line between coxal plates III and IV slightly oblique, directed posteromedially. Medial margin of coxae IV 1.0–1.2 times longer than medial margin of coxae III. Pos-



Figs 124–125. *Tiphys scaurellus*, larva: 124 — dorsal view, 125 — ventral view. Scale bar: 124–125 = 100.

teromedial angle of coxae IV moderately developed, obtuse, with short apodeme. Sclerites bearing setae *Hv* close together or fused with posterior margins of coxae II, other ventral idiosomal setae lying free in soft integument. Genital plates separated, oblique, directed anteromedially, bearing 2 acetabula and 3 short and fine setae each. Acetabula approximately subequal in size, distance between them usually equal to one diameter of acetabulum on each plate. Postgenital sclerite considerably larger than pregenital one. Excretory pore with small anterior sclerite.

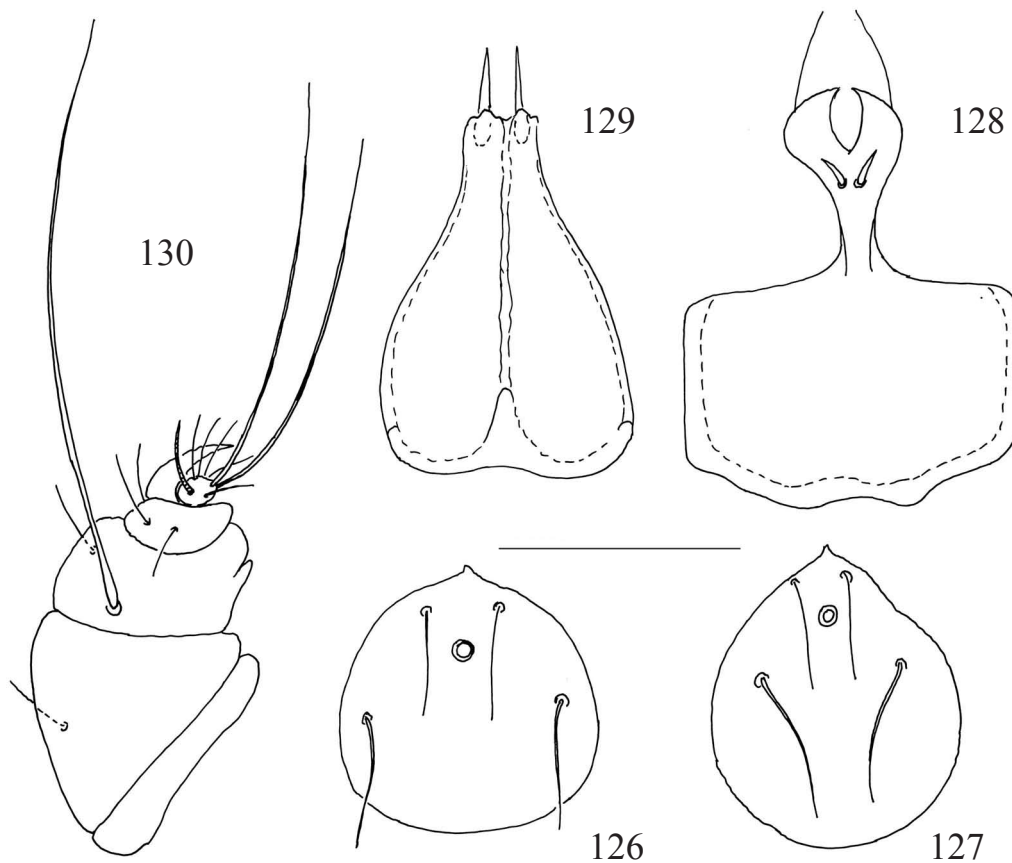
Pedipalpal trochanter (Fig. 121) without seta, femur with 3 dorsodistal setae. Ventral margin of femur straight or slightly convex, ventral margin of genu slightly concave. Pedipalpal genu with 2 setae, external lateral seta approximately twice as long as dorsodistal seta; base of external lateral seta inserted near middle of segment. Pedipalpal tibia slightly longer than femur, with rather long distolateral spine, 2 ventral and 1–2 dorsodistal setae. Both ventral setae situated in distal half of tibia on very small tubercles. Length of distolateral spine of tibia 0.40–0.55 of length of tarsus. Pedipalpal tarsus with long proximal solenidion, 3 thin setae and 4 thick distal spines.

All legs with swimming setae; two anterior pairs of legs with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 122). One swimming seta present on genu leg II and tibia of leg I, 2 on genu III–IV and tibia II, 3–4 on tibia III, 4–6 on tibia IV. Claws of legs I–III

larger than claws of legs IV. Internal denticle of claw of legs I–III rather wide with rounded tip, external denticle thin and pointed (Fig. 123).

Measurements, $n=9$. Body length 400–530, length of medial margin of coxa III 30–35, length of medial margin of coxa IV 35–45; length of anteromedial dorsal plates 30–35, width 10–12, length of genital plates 60–65, width 35–38; diameter of genital acetabula (*ac*. 1–2): 21–24, 18–22; length of basal segment of the chelicera 92–105; length of cheliceral stylet 340–45; length of pedipalpal segment (P-1–5): 28–30, 65–70, 45–50, 75–80, 28–32, length of distolateral spine on tibia 15–17; length of leg segments: I–Leg. 1–6: 48–50, 65–70, 65–70, 100–105, 110–115, 128–135; II–Leg. 1–6: 48–52, 68–72, 68–73, 100–105, 115–120, 140–145; III–Leg. 1–6: 55–58, 70–75, 68–73, 100–105, 120–130, 130–140; IV–Leg. 1–6: 80–84, 80–85, 88–92, 130–135, 145–155, 155–162.

Larva. Body small and nearly circular in shape. Dorsal shield with straight or convex anterior margin, rounded posteriorly, very convex lateral margins, its anterolateral margins are weakly concave (Fig. 124). Dorsal shield convex and slightly elongate (ratio length/width 1.15–1.20), covering almost all dorsum in unengorged larva and bearing 4 pairs of setae (*Fch*, *Fp*, *Vi*, *Oi*). Setae *Fch* and *Vi* slightly longer and thicker than *Fp* and *Oi*. Setae *Oe*, *Hi*, *He*, *Sci*, *Sce* and *Li* located on the soft wrinkled membrane. Setae *Oe* longest and thickest of all dorsal setae, setae *Li* shortest. Lateral sides of coxae II+III passing onto dorsal



Figs 126–130. *Tiphys scaurellus*, larva: 126–127 — excretory pore plate, 128 — capitulum (ventral view), 129 — chelicerae, 130 — pedipalp. Scale bars: 126–130 = 50.

side and almost extending to setae *Oi* and other hysterosomal setae located on interscutal membrane. Dorsal shield with reticulations.

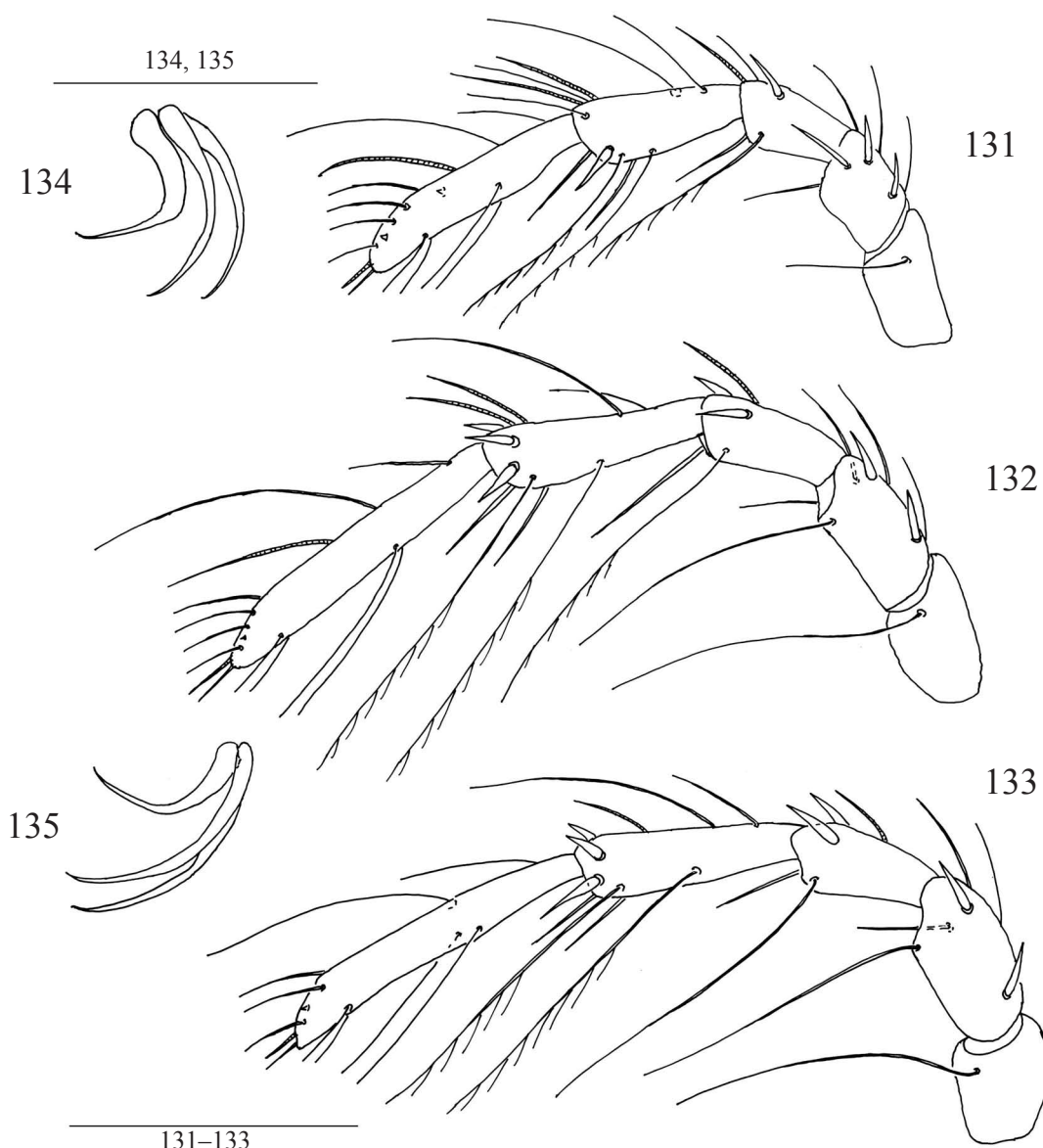
Coxal plates I–II relatively small; anterior coxal plates separated from coxal plates II and III which are fused to one another, suture line between them incomplete and developed only in their lateral parts (Fig. 125). Anterior margin of coxal plates I concave and shorter than posterior one. Setae *C1* and *C4* considerably shorter than *C2* and *C3*, the latter are approximately equal in length. Base of seta *C4* on coxal plate III and medial end of suture line between coxal plates II and III well separated. Posteromedial apodemes of coxal plates I small, sometimes they are absent, apodemes of coxal plates II not developed, and apodemes of coxal plates III poorly developed. Transverse muscle attachment scar not developed in posteromedial angles of coxal plates III. Setae *Ci*, *Si*, *Se*, *Le*, *Pi*, *Pe* situated on soft interscutal membrane in the posterior part of the body. Setae *Ci* longer and thicker than all ventral idiosomal setae, and situated on small bases; setae *Si* shortest and thin. Coxal plates I–III with reticulations. Urstigma small, occupying lateral position on the border between coxae I and II, and provided with a cup.

Excretory pore plate (Figs 126–127) oval or nearly circular, ratio length/width = 0.9–1.1. Excretory pore in anterior half of excretory pore plate, setae *Ai* shorter than *Ae* and placed close to anterior margin of this plate; setae *Ae* located near middle of excretory pore plate.

Capitulum (Fig. 128) short, with wide base, anterior hypostomal setae long and thin, posterior setae short, spine-like. Basal segments of chelicerae (Fig. 129) fused by their medial parts and tapering proximally; suture line well developed along their whole length. Cheliceral stylet small and crescent in shape.

Pedipalp trochanter (Fig. 130) short and without setae; dorsodistal seta of femur and genu short and approximately equal in size, proximal lateral genual seta very long and thick; tibia with 3 approximately subequal short and thin setae and with large dorsodistal claw. Pedipalpal tarsus with short solenidion, 2 long setae and 5 short unequal ones.

The general number of setae on legs I–III (Figs 131–133), except eupathidia, as follows: I–Leg. 1–5: 1, 7, 5 (s), 11(2s), 13 (s, ac); II–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5: 1, 6, 5(s), 10 (s), 11 (ac). Formula of large setae on leg segments as follows: I–Leg 1–5: 0, 2, 1, 1, 0;



Figs 131–135. *Tiphys scaurellus*, larva: 131 — leg I, 132 — leg II, 133 — leg III, 134 — claws of leg I, 135 — claws of leg III. Scale bars: 131–133 = 100, 134–135 = 25.

II—Leg 1–5: 0, 2, 2, 3, 0; III—Leg 1–6: 0, 2, 2, 3, 0. Solenidia on genua and tibiae of legs I–III relatively short. Solenidium on genu I slightly shorter than distal solenidium on tibia I; proximal solenidium on tibia I slightly shorter than distal one, solenidium on genu II and both solenidia on tibia II nearly equal in length; solenidium on genu III and solenidium on tibia III subequal. Central claw and lateral claws of legs I nearly subequal in size; on tarsi of legs I and II, empodium bent at right angle and ambulacra only slightly bent (Fig. 134). Distal part of empodium of leg III turned to ventral side at obtuse angle (Fig. 135).

Measurements, n=10. Length of dorsal shield 330–340, its width 280–290; length of excretory pore plate 46–55, width 48–52; length of capitu-

lum 85–90; length of basal segment of chelicera 70–76, length of chelicera stylet 18–20; length of medial margin of coxa I 85–90, length of medial margin of coxae II+III 135–140; length of pedipalpal segments (P-1–5): 9–10, 38–40, 23–25, 10–11, 8–9; length of legs segments: I—Leg. 1–5: 40–45, 39–43, 37–40, 58–60—80–92; II—Leg. 1–5: 40–45, 41–45, 43–46, 70–73, 88–97; III—Leg. 1–5: 40–45, 45–49, 43–47, 72–76, 102–107.

Ecology. Temporary ponds, sedge-sphagnum bogs, peat-bogs.

Geographical distribution. Europa, Russia: Arkhangelsk Province; Asia, Russia: Magadan Province, Kamchatka Territory, Primorsk Territory, Khabarovsk Territory (Tuzovsky 1983, 1990; Semenchenko et al 2010).

***Tiphys (Tiphys) lapponicus* (Neuman, 1880)**

Figs 136–171

Material. 6 females, 1 male, 3 deutonymphs: Russia, Magadan Province, Anadyr Distr., Markovo: lake on the left bank of the Anadyr river, 5 km upstream of settlement, June–July 1978 and 1981, P.V. Tuzovsky; 6 females, 28 larvae reared in laboratory (IBIW): Magadan Province, Tenka Distr., settlement Sibik-Tyellakh, July–August 1987, P.V. Tuzovsky; 11 female, 5 males, 6 deutonymphs: Magadan Province, Chaun Distr., temporary ponds on right bank of the Chaun river, 18 km upstream from mouth of the river, July–August 1982, P.V. Tuzovsky.

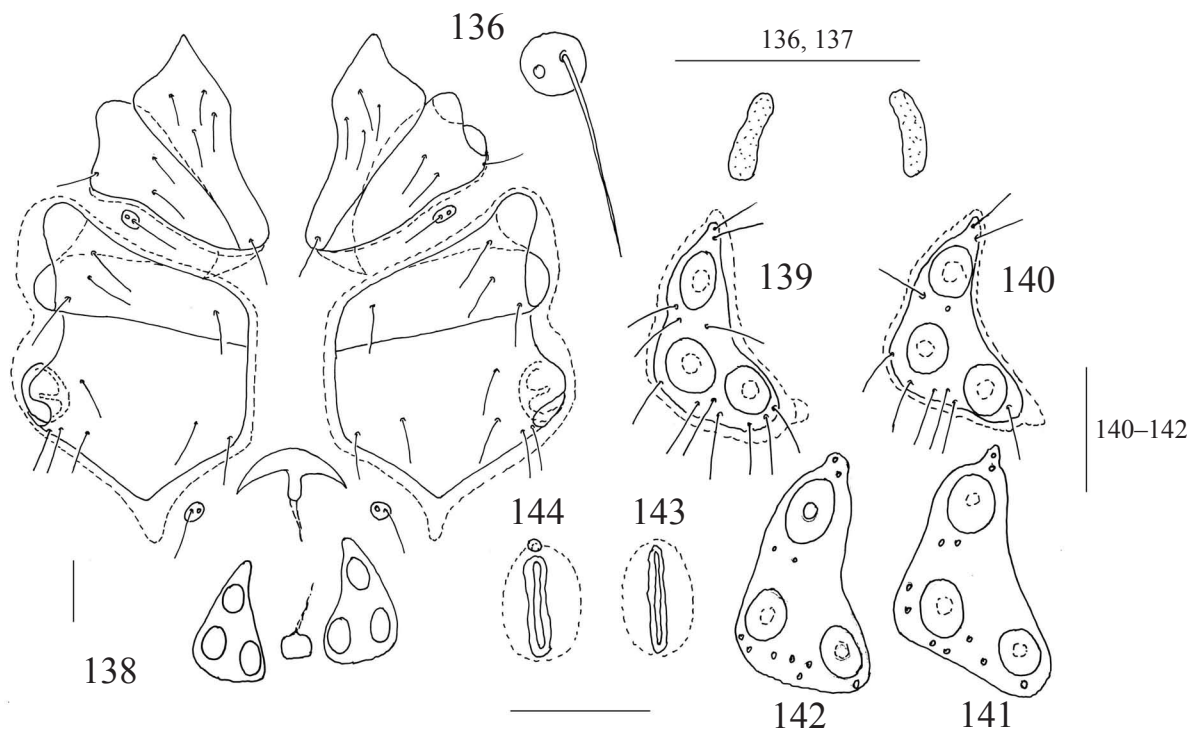
Diagnosis. Female. Medial margin of coxal plate IV twice as long as medial margin of coxal plate III. Posteromedial margin and posterolateral margin of coxae IV forming obtuse angle with short apodeme. Genital plates more or less triangular, with 3 acetabula and 10–13 short, fine setae each; all acetabula small, approximately subequal in size, and usually arranged in obtuse triangle or in an arc; genital opening longer than length of genital plates, anterior genital sclerite 2–3 times as width as posterior one. Pedipalps moderately developed; genu with 4 setae, distal external lateral seta considerably longer than other dorsal setae; base of distal external lateral seta attached near distal end of segment; tibia with short distolateral spine (4–5 times shorter than tarsus), both ventral setae long and located in middle of segment, ventral tubercles not developed. Claws of legs I–III are larger than claws of legs IV; both denticles approximately subequal in length, external denticle thin-pointed, and internal denticle expanded distally with rounded tip. Claw lamella moderately developed with nearly straight ventral margin.

Male. Coxae plates IV greatly expanded, touching each other posteromedially, medial margin of coxal plate IV 3.1–4.5 times longer than medial margin of coxal plate III. Suture line between coxal plates III and IV nearly transverse. Posteromedial margins of coxal plate IV slightly bowed or straight, oblique, directed posterolaterally; genital bay shallow, most of the genital field lying outside the genital bay. Genital plates triangular, fused medially. Anterior genital sclerite small, transverse, with two pairs of short and fine setae. Genital plates with 4 short and fine setae each. Sclerites bearing setae *Hv* closely together with posterior margin of coxae II; other sclerites bearing ventral idiosomal setae lying free in soft integument.

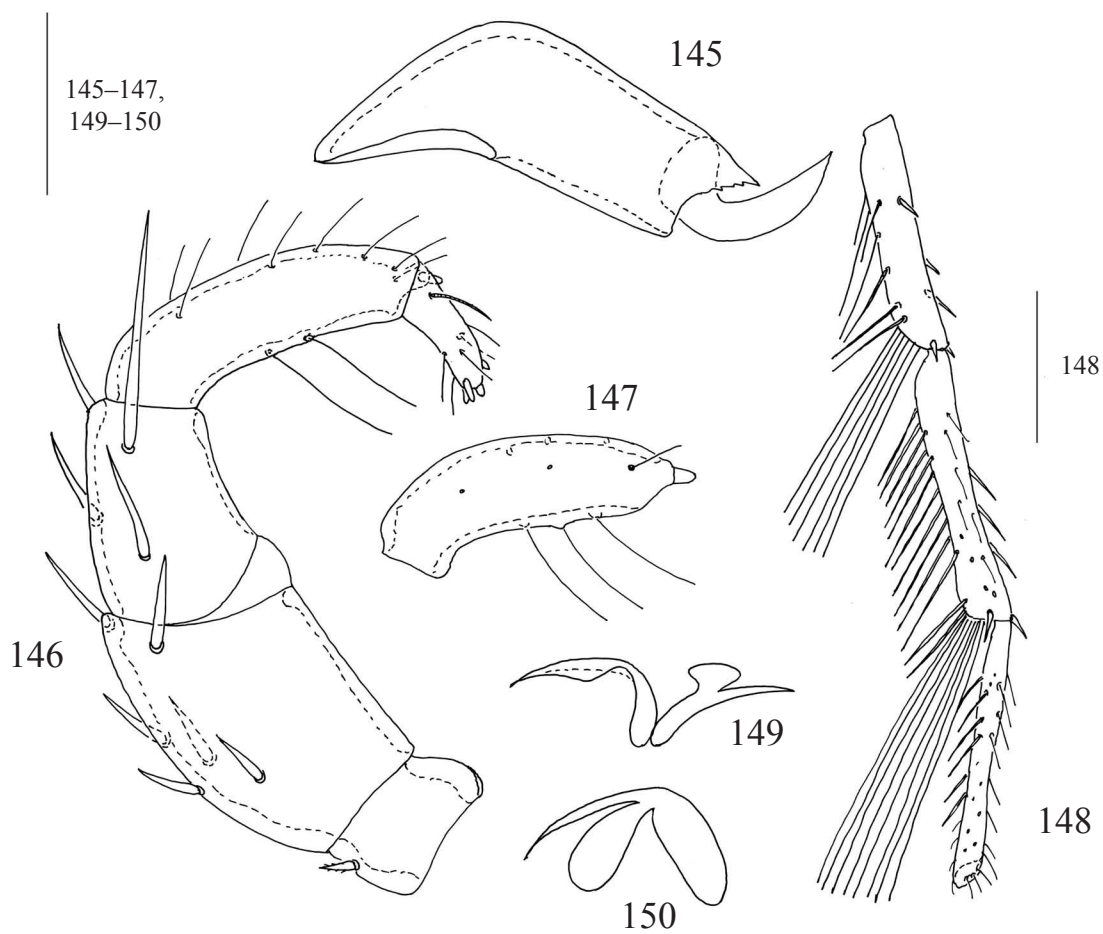
Deutonymph. Dorsum with well developed anteromedial plates only. Medial margin of coxae IV longer than medial margin of coxae III. Posteromedial angle of coxa IV moderately developed with long apodeme. Genital plates with 2 acetabula and 3 short and fine setae each, both acetabula relatively large and approximately subequal in size, distance between acetabula usually less than one diameter of acetabulum on each plate. Postgenital sclerite considerably larger than pregenital sclerite. Excretory pore non-sclerotized. Pedipalpal genu with 2 setae, external lateral seta longer than dorsodistal seta; base of external lateral seta located near distal end of segment; bases of ventral setae on tibia separated and located in middle of segment, distolateral spine of tibia 5–6 times as short as tarsus.

Larva. Dorsal shield elongate (ratio length/width 1.5–1.6), covering almost all dorsum in unengorged larva; setae *Fch* longer than *Fp*, *Vi* and *Oi*. Setae C1 considerably shorter than setae C2, setae C3 and C4 longer than setae C2; base of setae C4 on and medial end of suture line between coxal plates II and III well separated. Transverse muscle attachment scar absent. Dorsal shield and coxal plates I–III with reticulations. Excretory pore plate oval, ratio length/width 1.1–1.3. Setae *Ai* located in front of setae *Ae*, last longer than *Ai*. Excretory pore open between rows setae *Ai* and *Ae* in anterior half of excretory pore plate Solenidion on genu I and both solenidia on tibia I subequal in length; solenidion on genu II and proximal solenidion on tibia II subequal in length and slightly shorter than distal solenidion on tibia II.

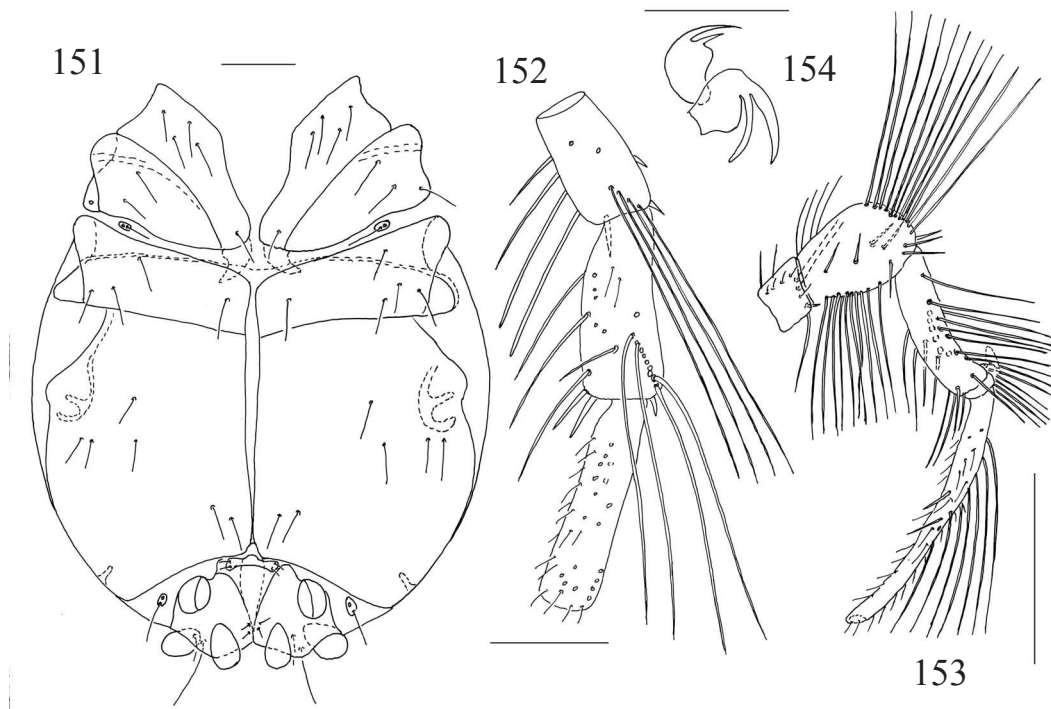
Description. Female. Body oval; setae *Fch* long, whip-like (Fig. 136), other idiosomal setae filiform. Integument soft with very fine strips. Dorsum with relatively large anteromedial platelets (Fig. 137), anterolateral and posteromedial platelets rudimentary or absent. Coxal plate I usually with 4 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 2–3 lateral thin setae (Fig. 138). Apodeme of coxal plate I moderately developed and usually not extending beyond medial margin of coxal plate III. Suture line between coxal plates III and IV oblique, directed posteromedially. Medial margin of coxal plate IV twice as long as medial margin of coxal plate III. Posteromedial margin and posterolateral margins of coxae IV forming right or obtuse angle with short apodeme beneath this angle. Sclerites, bearing setae *Hv* other idiosomal setae, lying free in soft integument.



Figs 136-144. *Tiphys lapponicus*, female: 136 — seta Fch, 137 — anteromedial dorsal plates, 138 — ventral view, 139-142 — genital plates, 143-144 — excretory pore. Scale bars: 136-142 = 100, 143-144 = 50.



Figs 145-150. *Tiphys lapponicus*, female: 145 — chelicera, 146 — pedipalp, 147 — pedipalpal tibia, 148 — genu, tibia and tarsus of leg IV, 149-150 — claw. Scale bars = 100.



Figs 151–154. *Tiphys lapponicus*, male: 151 — ventral view, 152 — genu, tibia and tarsus of leg III, 153 — telofemur, genu, tibia and tarsus of leg IV, 154 — claws of leg III. Scale bars: 151–153 = 100, 154 = 50.

Genital plates more or less triangular (Figs 139–142), with 3 acetabula and 10–13 short, fine setae each. All acetabula small, subequal in size and usually arranged in an obtuse triangle or sometimes in an arc; acetabula occupying approximately half or less of area of genital plate; distance between first and second acetabula and second and third acetabula usually less than diameter of one acetabulum. Genital opening longer than genital plates, pregenital sclerite 2–3 times as wide as postgenital sclerite. Excretory pore non-sclerotized (Fig. 143) or with very small anterior sclerite (Fig. 144).

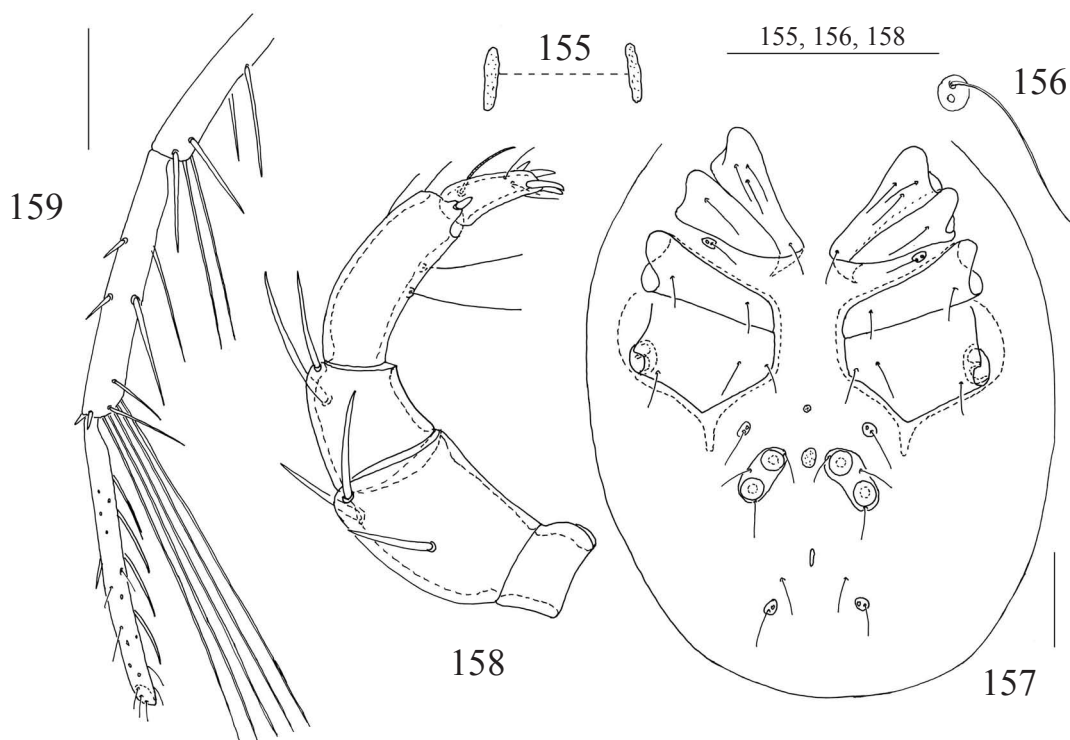
Capitulum with short anchoral projection, both pairs of setae equal in length. Basal segment of chelicera (Fig. 145) large, with strong convex dorsal margin and slightly concave ventral margin. Cheliceral stylet moderately developed, pointed.

Pedipalps (Fig. 146) rather slender. Pedipalpal trochanter with a single short dorsodistal seta, femur with 3–5 proximal and 2 dorsodistal setae. Ventral margin of femur straight or slightly concave, ventral margin of genu concave. Pedipalpal genu with 4 setae, distal external lateral seta considerably longer than other dorsal setae; base of distal external lateral seta attached near distal end of segment. Pedipalpal tibia slightly longer than femur with short distolateral spine (4–5 times as short as tarsus), usually 2 (sometimes 3, Fig. 147) rather long ventral setae and several fine dorsal

ones, both ventral setae inserted near middle of tibia; distolateral peg-like spine of tibia short with obtuse tip. Pedipalpal tarsus with one long proximal solenidion, 5 thin setae and 4 thick distal unequal.

Legs II–IV with swimming setae; second pair of legs with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 148). Three swimming setae present on genu of legs II, 4–5 on tibia II and genu III, 5–6 on genu IV, 6–8 on tibia III and 8–9 on tibia IV. Claws of legs I–III are larger, than claws of legs IV; both denticles subequal in length, external denticle thin pointed, and internal denticle expanded distally with rounded tip (Fig. 149–150). Claw lamella moderately developed with nearly straight ventral margin.

Measurements (n=10). Body length 1000–1315, length of medial margin of coxa III 65–80, length of medial margin of coxa IV 110–150; length of anteromedial dorsal plates 55–70, their width 15–20, length of genital plates 160–195, their width 80–125; length/width of genital acetabula (ac. 1–3): 42–48/30–36, 40–45/30–35, 36–48/30–36; width of anterior genital sclerite 65–80; length of basal segment of chelicera 170–205, length of cheliceral stylet 73–80; length of pedipalpal segment (P-1–5): 45–50, 155–172, 95–125, 160–180, 73–82; length of distolateral spine of tibia 12–18; length of leg segments: I–Leg. 1–6: 90–100, 160–190, 180–220, 250–285, 270–295,



Figs 155–159. *Tiphys lapponicus*, deutonymph: 155 — anterior dorsal plates, 156 — seta Fch, 157 — ventral view, 158 — pedipalp, 159 — genu, tibia and tarsus of leg IV. Scale bars = 100.

285–325; II–Leg. 1–6: 90–105, 170–205, 185–220, 230–285, 285–320, 285–325; III–Leg. 1–6: 95–125, 160–205, 180–235, 260–305, 300–360, 285–325; IV–Leg. 1–6: 160–190, 195–230, 220–270, 325–390, 375–425, 340–395.

Male. Dorsal surface, coxae of legs I–III as in female. Anterior apodemes rather large, extending beyond medial margin of coxal plate III; posterior apodemes slightly developed (Fig. 151). Coxae plates IV greatly expanded, touching each other posteromedially, with 2 short and fine setae close together in this region on each side. Medial margin of coxal plate IV 3.1–4.5 times longer than medial margin of coxal plate III. Suture line between coxal plates III and IV nearly transverse. Posteromedial margins of coxal plate IV slightly bowed or straight, oblique, directed posterolaterally; lateral margins of these coxal plates convex. Genital plates triangular, fused medially; all acetabula subequal in size. Anterior genital sclerite small, transverse with two pairs of short and fine setae; genital plates with 2–4 short, fine setae each. Sclerites, bearing all ventral idiosomal lying free in soft integument. Excretory pore unsclerotized.

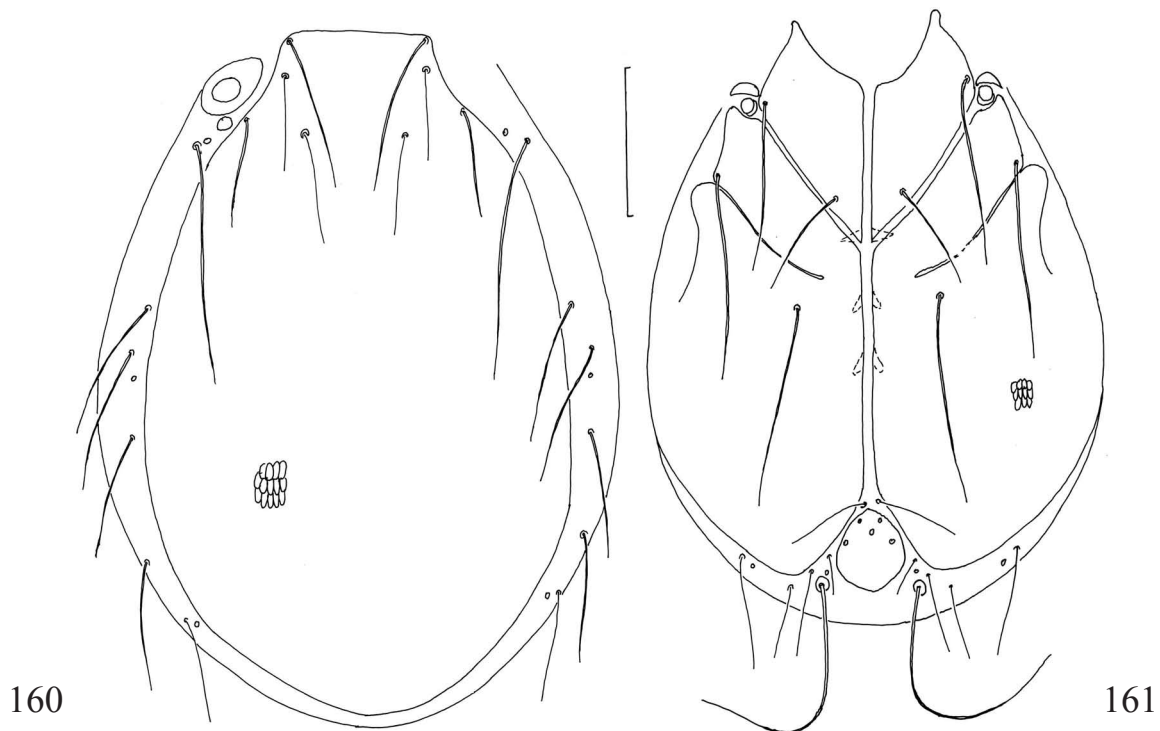
Capitulum, chelicerae and pedipalps as in female, but pedipalpal tibia with more numerous dorsal setae.

Genu of leg III (Fig. 152) shorter than tibia III, and tarsus III slightly longer than tibia III;

genu III with 4–5 and tibia III with 8–9 long swimming setae. Telofemur IV (Fig. 153) very short, genu IV slightly expanded dorsoventrally in distal half, bearing a few dorsal and ventral setae, and several relatively short lateral setae; dorsal setae arranged in two groups: proximal group with several relatively short and thin setae; distal group with a few long and thick setae. Tibia IV slightly curved, with concave dorsal margin and convex ventral one, with numerous unequal setae but without long swimming setae, and a single short fan-shaped seta. Tarsus of leg IV considerably longer than tibia, slightly tapering distally with numerous short setae and 6–8 long unequal swimming setae.

Claw of legs I and II similar to female. Claws of legs III (Fig. 154) asymmetrical, large claw with 2 long subequal denticles, clawlet with relatively long external and short internal pointed denticles.

Measurements (n=6). Length of body 650–860, length of medial margin of coxa III 60–80, length of medial margin of coxa IV 240–270; length of anteromedial dorsal plates 40–55, width 12–15; length of genital plates 105–130, general width 220–245; length/width of genital acetabula (ac. 1–3): 42–60/36–42, 36–60/35–42, 42–60/36–48; length of basal segment of chelicera 145–165; length of cheliceral stylet 55–65; length of pedi-



Figs 160–161. *Tiphys lapponicus*, larva: 160 — dorsal view, 161 — ventral view. Scale bar: 160–161 = 100.

palpal segment (P-1–5): 30–40, 115–130, 80–90, 115–140, 48–57; length of distolateral spine of tibia 9–12; length of leg segments: I–Leg. 1–6: 75–80, 145–155, 145–165, 195–235, 210–290, 325–350; II–Leg. 1–6: 75–100, 130–155, 145–165, 195–235, 200–255, 310–345; III–Leg. 1–6: 90–100, 120–155, 95–105, 120–130, 160–190, 200–240; IV–Leg. 1–6: 145–180, 150–170, 105–115, 195–230, 265–295, 445–490.

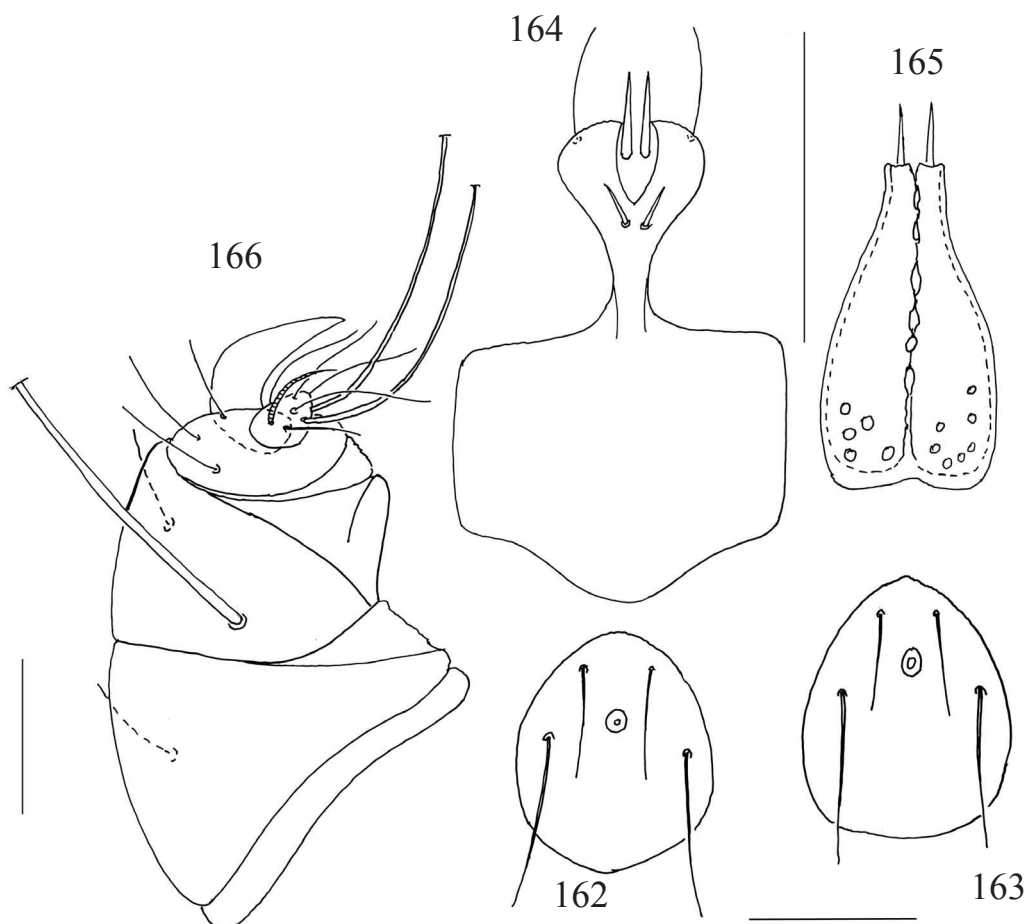
Deutonymph. Dorsum with well developed anteromedial plates only (Fig. 155). Setae *Fch* long and thin (Fig. 156). Coxal plate I usually with 3 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 1 lateral thin setae, coxal plate III with 1 medial seta and 1–2 lateral thin setae, coxal plate IV with 2 medial seta and 1 lateral seta (Fig. 157). Apodeme of coxal plate I moderately developed and not reaching medial margin of coxal plate III. Suture line between coxal plates III and IV oblique, directed posteromedially. Medial margin of coxae IV longer than medial margin of coxae III. Posteromedial angle of coxae IV moderately developed, with short apodeme. Sclerites bearing setae *Hv* and other ventral idiosomal setae lying free in soft integument. Genital plates separated, oblique, directed anteromedially, bearing 2 acetabula and 3 short and fine setae each. Both acetabula approximately subequal in size, distance between them usually lesser than one diameter of

acetabulum. Postgenital sclerite larger than pregenital sclerite. Excretory pore unsclerotized.

Pedipalpal trochanter without seta, femur with 3 dorsodistal setae (Fig. 158). Ventral margin of femur straight or slightly curved, ventral margin of genu concave. Pedipalpal genu with 2 setae, external lateral seta longer than dorsodistal seta and inserted near distal end of segment. Pedipalpal tibia with short distolateral peg-like spine, 2 ventral and 2 dorsodistal setae; bases of ventral setae separated and inserted near middle of segment. Distolateral seta of tibia short, with obtuse tip, 5–6 times shorter than tarsus. Pedipalpal tarsus with single long proximal solenidion, 3 thin setae and 4 distal unequal setae.

Legs II–IV with swimming setae; legs II with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 159). One or 2 swimming setae present on genu legs II–IV and tibia II, 2–3 on tibia III, 4–5 on tibia IV. Claws of legs I–III larger, than claws of legs IV; both denticles approximately subequal in length, external denticle thin and pointed, internal denticle expanded distally with rounded tip. Claw lamella slightly developed, with straight ventral margin.

Measurements, $n=9$. Body length 530–735, length of medial margin of coxa III 24–36, length of medial margin of coxa IV 45–55; length of anteromedial dorsal plates 25–48, their width 9–15,



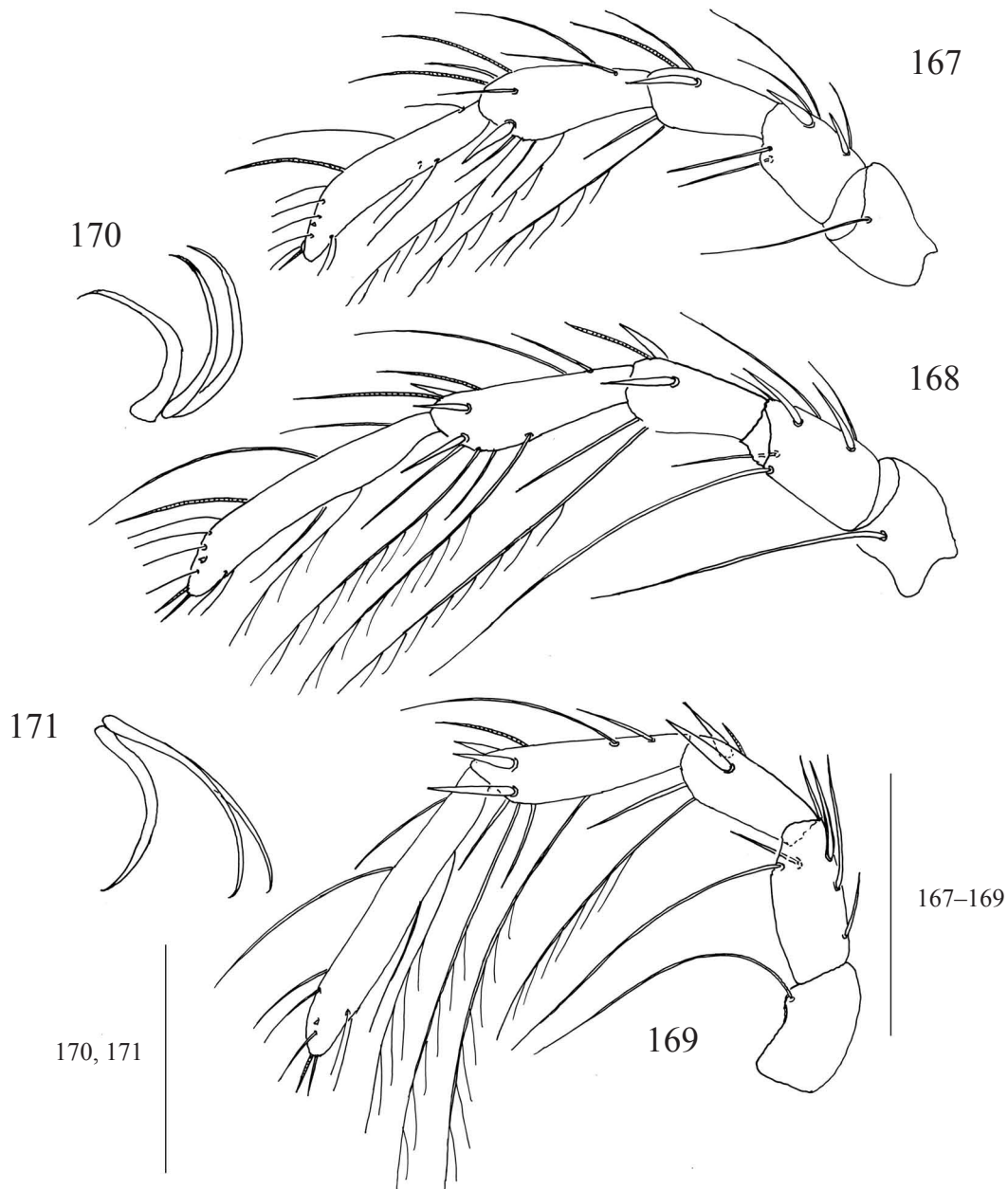
Figs 162–166. *Tiphys lapponicus*, larva: 162–163 — excretory pore plate, 164 — capitulum (ventral view), 165 — chelicerae, 166 — pedipalp. Scale bars: 162–163 = 50, 164–165 = 100, 166 = 20.

length of genital plates 60–70, their width 35–40; diameter of genital acetabula (*ac.* 1–2): 22–30, 24–32; length of basal segment of the chelicera 120–125; length of the cheliceral stylet 55–57; length of pedipalpal segment (P-1–5): 24–32, 84–92, 55–65, 87–92, 44–48; length of distolateral spine on tibia 7–11; length of leg segments: I–Leg. 1–6: 48–52, 80–85, 100–115, 130–140, 150–165, 170–185; II–Leg. 1–6: 52–57, 80–90, 98–103, 148–155, 165–175, 185–195; III–Leg. 1–6: 57–63, 80–90, 103–110, 140–150, 170–180, 180–195; IV–Leg. 1–6: 88–95, 88–95, 120–125, 160–168, 200–210, 225–235.

Larva. Body small and oval; dorsal shield truncated anteriorly, rounded posteriorly, with convex lateral margins and weakly concave anterolateral margins near eyes plates (Fig. 160). Dorsal shield elongate (ratio length/width 1.5–1.6), covering almost all dorsum in unengorged larva and bearing 4 pairs of setae (*Fch*, *Fp*, *Vi*, *Oi*); setae *Fch* longer than *Fp*, *Vi* and *Oi*. Setae *Oe*, *Hi*, *He*, *Sci*, *Sce* and *Li* located on the soft wrinkled membrane. Setae *Oe* longest and thickest of all dorsal setae, setae *Si* slightly shorter than *Sce*. Lateral

sides of coxae II+III passing onto dorsal side and almost extending to setae *Oi* and other hysterosomal setae located on interscutal membrane. Dorsal shield with a reticulations.

Coxal plates I–II relatively small; anterior coxal plates separated from coxal plates II and III which fused, suture line between them incomplete and developed only in their lateral parts (Fig. 161). Anterior margin of coxal plates I concave and considerably shorter than posterior margin. Setae C1 considerably shorter than setae C2–C4, base of setae C4 and medial end of suture line between coxal plates II and III well separated. Posteromedial apodemes of coxal plates I–III poorly developed, sometimes apodemes 2 absent. Transverse muscle attachment scar not developed in the posteromedial angles of coxal plates III. Setae *Ci*, *Si*, *Se*, *Le*, *Pi*, *Pe* situated on the soft interscutal membrane in posterior part of body. Setae *Ci* very long, thicker than all ventral idiosomal setae and situated on small bases; setae *Si* shortest and thin. Coxal plates I–III with reticulations on it. Urstigma occupying a lateral position on the border between coxae I and II and provided with cups.



Figs 167–171. *Tiphys lapponicus*, larva: 167 — leg I, 168 — leg II, 169 — leg III, 170 — claws of leg I, 171 — claws of leg III. Scale bars: 131–133 = 100, 134–135 = 25.

Excretory pore plate (Figs 162–163) oval, ratio length/width = 1.1–1.3. Setae *Ai* located near anterior margin of excretory pore plate, setae *Ae* longer than setae *Ai* and placed near middle of this plate. Excretory pore located in anterior half of excretory pore plate between rows setae *Ai* and *Ae*.

Capitulum (Fig. 164) with a wide base, anterior hypostomal setae longer and thinner than posterior ones. Basal segments of chelicerae (Fig. 165), fused at their medial parts and tapering proximally; suture line between them well developed along their whole length. Cheliceral stylet small and crescent in shape.

Pedipalp trochanter (Fig. 166) short and without setae; femur with 1 short and thin seta; genu with 1 very long proximal seta and short and thin distal one; tibia with 3 approximately subequal setae, and large dorsodistal claw. Pedipalpal tarsus with 1 short solenidion, 2 long and relatively thick setae and 5 unequal thin setae.

All legs rather long. General number of setae on legs I–III (Figs 167–169), except eupathidia, is as follows: I–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); II–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5: 1, 6, 5(s), 10 (s), 11 (ac). Formula of large setae on leg segments as follows: I–Leg 1–5:

0, 2, 1, 1, 0; II-Leg 1-5: 0, 2, 2, 3, 0; III-Leg 1-6: 0, 1, 2, 3, 0. Solenidion on genu of leg I and both solenidia on tibia I approximately equal in length; solenidion on genu II and proximal solenidion on tibia II slightly shorter than distal solenidion on tibia II; solenidion on genu of leg III shorter than solenidion on tibia III. Central claw and lateral claws on tarsi of legs I-II almost subequal in size; on tarsi of legs I and II, empodium bent at right angle and ambulacra only slightly bent (Fig. 170). Distal part of empodium of leg III turned onto ventral side at obtuse angle (Fig. 171).

Measurements (n=10). Length of dorsal shield 350-390, its width 225-245; length of anal plate 38-55, its width 38-45; length of the capitulum 105-112; length of basal segment of the chelicera 95-102, length of cheliceral stylet 20-26; length of medial margin of coxae I 80-96, length of medial margin of the coxae II+III 155-180; length of anal plate 44-55, width 38-44; length of pedipalpal segments (P-1-5): 8-10, 40-43, 26-29, 9-12; length of legs segments: I-Leg. 1-5: 35-40, 38-44, 44-48, 62-64, 84-86; II-Leg. 1-5: 35-44, 38-54, 48-52, 72-75, 100-105; III-Leg. 1-5: 44-48, 45-52, 48-52, 76-80, 110-115.

Ecology. Temporary ponds, sedge bogs, lakes with macrophytes, streams.

Geographical distribution. Europe (Viets 1936, 1956; Lundblad 1968, K.O. Viets 1978), Asia; Russia: Leningrad Province, Komi Republic, and Magadan Province (Sokolow and Yankovskaya 1962; Tuzovsky 1990).

Tiphys (Tiphys) latipes (Müller, 1776)

Figs 172-204

Material. 3 females, 1 male: Asia, Russia: Kemerovo Province, Prokopjevsk Distr., village Sharap, spring, 15 July 1973, 5 females: Magadan Province, Tenka Distr., village Agrobasa, June-July 1979, 26 females, 11 males, 3 deutonymph and 30 larvae reared in laboratory (IBIW); Europe, Russia: Yaroslavl Province, Nekouz Distr., near settlement Borok, temporary pond, sedge bogs, sedge-sphagnum bogs, April-July 2002-2006, P.V. Tuzovsky.

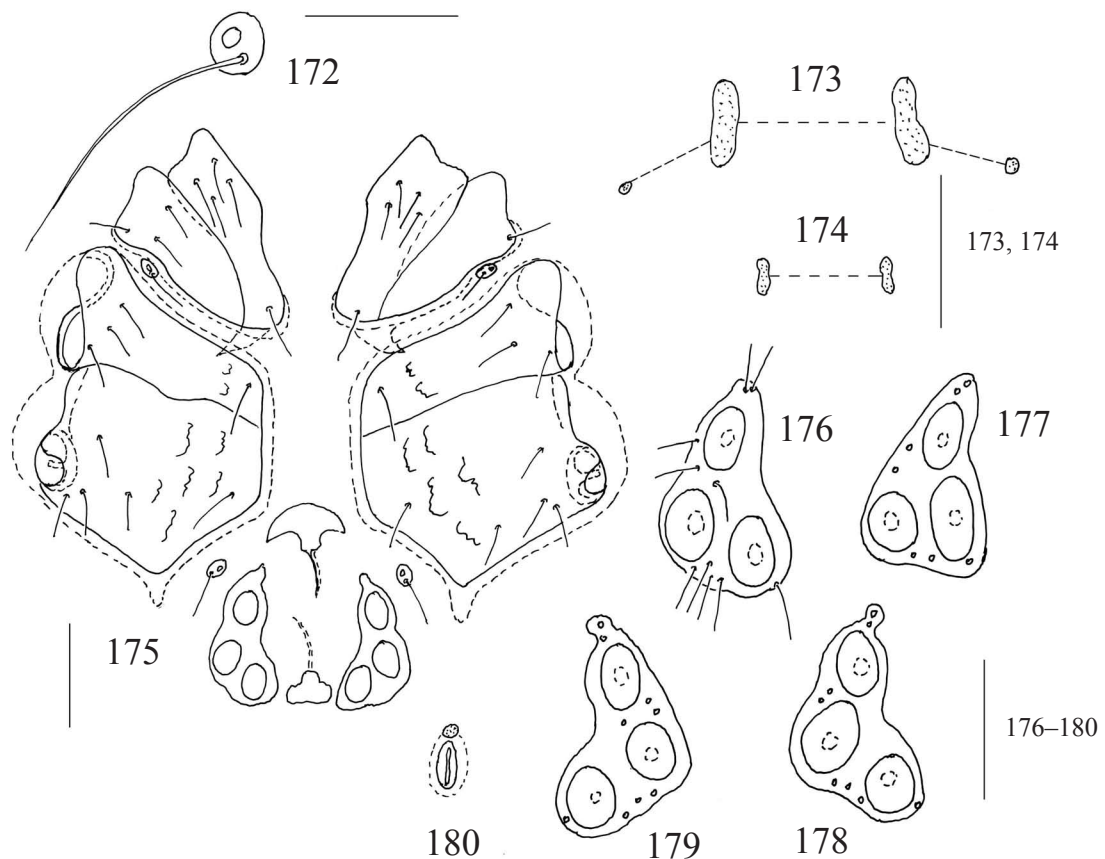
Diagnosis. Female. Medial margin of coxal plate IV longer than medial margin of coxal plate III. Posteromedial and posterolateral margins of coxae IV forming obtuse angle with a short apodeme. Genital plates lying in an arc or more or less triangular, with 3 acetabula and 8-11 short and fine setae each. Genital opening and genital plates approximately subequal in length, anterior genital

sclerite considerably wider than posterior one. Pedipalpal genu with 3 setae, external lateral seta longer than other dorsal setae; base of external lateral seta situated proximally to the middle of the segment. Pedipalpal tibia with short distolateral seta (2.5-3.0 times shorter than tarsus), both ventral setae situated on small tubercles distally to the middle of the segment.

Male. Coxal plates IV greatly expanded, touching each other along whole medial margin, posterior margin of coxal plate IV nearly transverse, genital bay shallow. Medial margin of coxal plate IV 3.2-4.0 times longer than medial margin of coxal plate III. Genital plates triangular, fused medially. Genital plates with 4-5 short, fine setae each. Sclerites bearing setae *Pe* fused with posteromedial margin of coxae IV; sclerites bearing setae *Hv* fused with posterior margin of coxae II; other sclerites, bearing ventral idiosomal setae, lying free in soft integument. Genu IV greatly expanded dorsoventrally in proximal half of segment. Tibia IV slightly curved with a single thick dorsodistal seta and long ventrodistal swimming setae. Tarsus and tibia IV nearly subequal in length. Claws of legs III asymmetrical, large claw with subequal external and internal denticles, external denticle provided by thin spur; small claw with short external and short internal denticles.

Deutonymph. Dorsum without true dorsal plates. Medial margin of coxae III slightly longer than medial margin of coxae III. Genital plates separated, oblique, directed anteromedially, both acetabula subequal in size, distance between them usually more than one diameter of acetabulum. Postgenital and pregenital sclerites subequal in size, situated closely to each other between anterior ends of genital plates. Pedipalpal genu with 2 setae, external lateral seta considerably longer than dorsodistal one; base of external lateral seta situated distally to middle of segment. Pedipalpal tibia with very long distolateral seta (0.65-0.70 of length of tarsus), base of ventral setae separated and situated on small tubercles in the middle of the segment.

Larva. Dorsal shield elongate (ratio length/width 1.5-1.6), covering almost complete dorsum in unengorged larva and bearing only 2 pairs of trichobothria (*Fp*, *Oi*), setae *Fch* and *Vi* situated on subcutaneous extensions of dorsal shield. Setae *Fch* and *Vi* slightly longer than *Fp* and *Oi*. All coxal setae (C1-C4) long and approximately subequal in length. Base of setae C4 on coxal plate III situated closely to medial end of suture line between



Figs 172–180. *Tiphys latipes*, female: 172 — seta *Fch*, 173 — anteromedial and anterolateral dorsal plates, 174 — posteromedial plates, 175 — ventral view, 176–179 — genital plate, 180 — excretory pore. Scale bars: 172 = 50, 173–180 = 100.

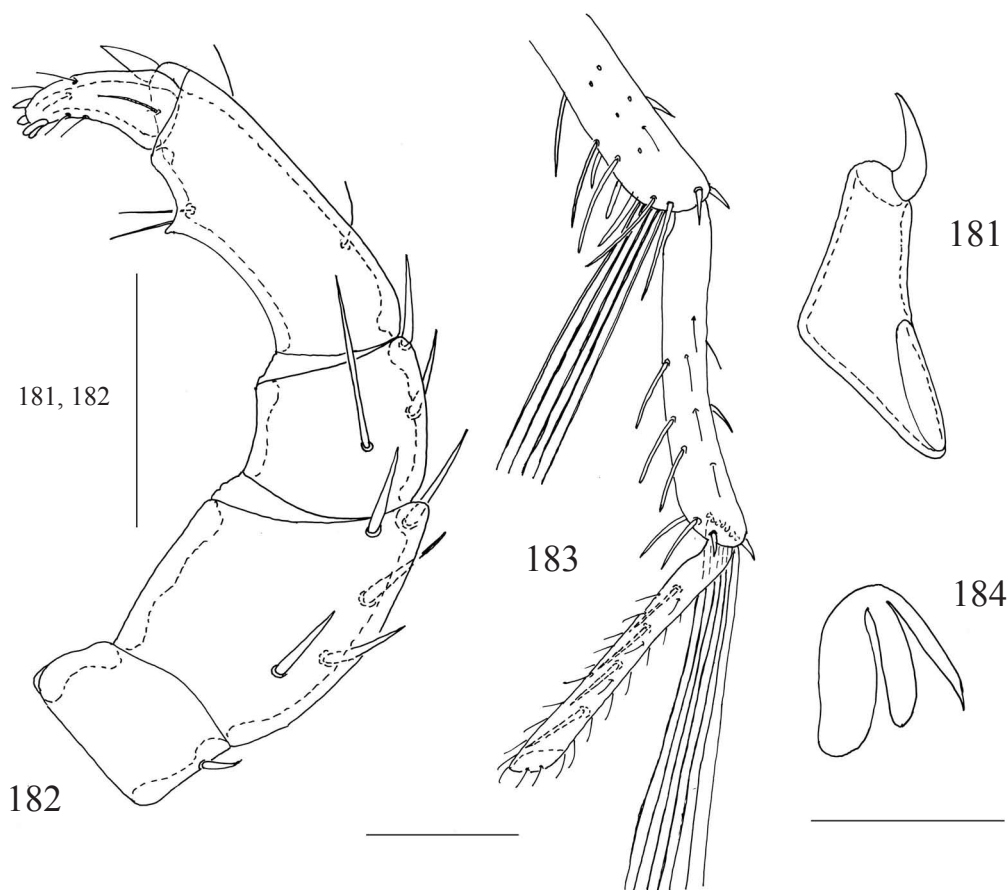
coxal plates II and III. Transverse muscle attachment scar on coxal plate III present. Dorsal shield and coxal plates I–III porous. Excretory pore plate wider than long or nearly as long as wide, ratio length/width = 0.8–1.0, setae *Ae* longer than setae *Ai*; excretory pore open in posterior half of anal plate. Solenidion on genu of leg I slightly longer than distal solenidia on tibia I which subequal in length; solenidion on genu II shorter than proximal solenidion on tibia II, latter slightly shorter than distal solenidion on tibia II.

Description. Female. Body oval; setae *Fch* long, whip-like (Fig. 172), other idiosomal setae filiform. Dorsum with relatively large anteromedial platelets, small anterolateral and posteromedial platelets (Figs 173–174). Anteromedial and posteromedial plates elongate, anteromedial platelets oval or nearly circular. Coxal plate I usually with 4 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 3 lateral thin setae, coxal plate III with 1 medial seta and 3 lateral setae, coxal plate IV with 1 medial seta and 4–5 lateral setae (Fig. 175). Apodeme of coxal plate I moderately developed and usually in mature specimens extending beyond medial margin of coxal plate

III. Suture line between coxal plates III and IV oblique, directed posteromedially. Medial margin of coxal plate IV longer than medial margin of coxal plate III. Posteromedial and posterolateral margins of coxae IV forming right or obtuse angle with short apodeme. Sclerites, bearing setae *Hv*, fused with posteromedial margin of coxa II, other idiosomal setae lying free in soft integument.

Genital plates slightly elongate and lying in an arc or more or less triangular (Figs 176–179) with 3 acetabula and 8–11 short and fine setae each. All acetabula small, subequal in size and arranged in an arc or in a triangular shape; acetabula occupying approximately half of area of the genital plate; distance between first and second acetabula, and second and third acetabula lesser than diameter one acetabulum. Genital opening and genital plates subequal in length, anterior genital sclerite wider than posterior one. Excretory pore with a very small anterior sclerite (Fig. 180).

Capitulum with short anchoral projection, both pairs of setae equal in length. Basal segment of chelicera (Fig. 181) large, with obtuse dorsal hump and slightly concave ventral margin. Cheliceral stylet relatively small, pointed.



Figs 181–184. *Tiphys latipes*, female: 181 — chelicera, 182 — pedipalp, 183 — genu, tibia and tarsus of leg IV, 184 — claw. Scale bars: 181–183= 100, 184 = 50.

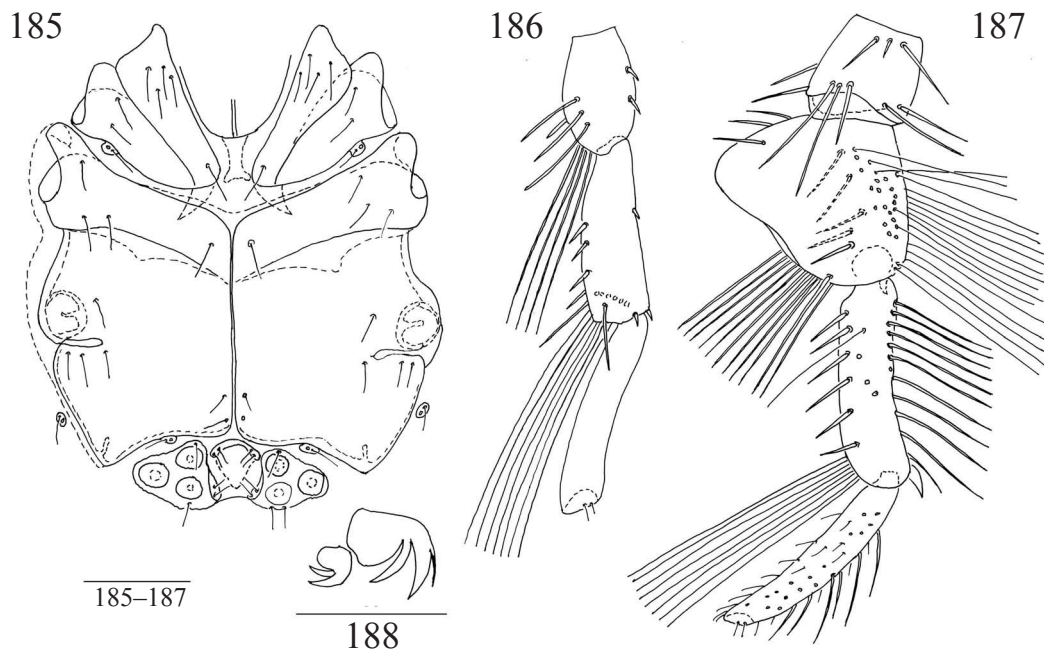
Pedipalps (Fig. 182) moderately developed. Pedipalpal trochanter with a short dorsodistal seta, femur with 3–4 dorsoproximal and 2 dorsodistal setae. Ventral margin of femur straight or slightly convex, ventral margin of genu slightly concave. Pedipalpal genu with 3 setae, external lateral seta considerably longer than other dorsal setae; base of external lateral seta inserted proximally to middle of segment. Pedipalpal tibia thin, slender, with a short distolateral seta, 2 ventral setae and 2–3 short and fine dorsal setae. Both ventral setae inserted in distal portion of tibia on small tubercles. Distolateral peg-like seta of tibia 2.5–3.0 times shorter than tarsus. Pedipalpal tarsus tapering distally with long proximal solenidion, 5 thin setae and 4 thick unequal distal setae.

Legs II–IV with swimming setae; second pair of legs with short swimming setae, two posterior pairs of legs with long swimming setae (Fig. 183). Three or four swimming setae present on genu and tibia of legs II, 2–3 on genu III, 4–5 on genu IV and tibia III, and 4–7 on tibia IV. Claws of legs I–III larger than claws of legs IV; both denticles approximately subequal in length, external denticle thin pointed, and internal denticle wide with more

or less rounded tip (Fig. 184). Claw lamella moderately developed with slightly convex or straight ventral margin.

Measurements (n=10). Body length 650–1200, length of medial margin of coxa III 48–60, length of medial margin of coxa IV 65–90; length of anteromedial dorsal plates 50–65, width 18–25, length of genital plates 120–165, width 60–95; length/width of genital acetabula (*ac.* 1–3): 48–60/35–42, 42–55/35–42, 48–65/36–45; width of anterior genital sclerite 78–90; length of basal segment of chelicera 140–155, length of cheliceral stylet 55–60; length of pedipalpal segment (P-1–5): 40–48, 110–125, 60–80, 120–140, 50–60; length of distolateral spine on tibia 20–24; length of leg segments: I–Leg. 1–6: 55–75, 105–125, 115–130, 145–165, 160–180, 200–210; II–Leg. 1–6: 75–80, 110–130, 120–140, 155–180, 170–195, 220–230; III–Leg. 1–6: 80–90, 105–130, 120–140, 155–175, 185–220, 195–220; IV–Leg. 1–6: 135–155, 115–145, 155–175, 210–230, 235–255, 235–245.

Male. Dorsal surface, coxae of legs I–III as in female. Anterior apodemes rather large, extending beyond medial margin of coxal plate III; posterior apodemes slightly developed (Fig. 185). Coxae



Figs 185–188. *Tiphys latipes*, male: 185—ventral view, 186—genu, tibia and tarsus of leg III, 187—telofemur, genu, tibia and tarsus of leg IV, 188—claws of leg III. Scale bars: 185–187 = 100, 188 = 50.

plates IV greatly expanded, touching each other along whole medial margins, abruptly depressed posteromedially, with 2 short and fine setae anterior to depressed region on each plate. Posterior margin of coxal plate IV nearly transverse, genital bay shallow. Medial margin of coxal plate IV 3.0–4.0 times longer than medial margin of coxal plate III. Suture line between coxal plates III and IV oblique, directed posteromedially. Genital plates triangular, fused medially; all acetabula approximately equal in size and occupying about one half of area of plates. Anterior genital sclerite small and curved, with two pairs of short and fine setae. Genital plates with 2–5 short, fine setae each. Sclerites bearing setae *Pe* fused with posteromedial margin of coxae IV; sclerites bearing setae *Hv* fused with posterior margin of coxae II; other sclerites bearing ventral idiosomal setae lying free in soft integument. Excretory pore with small anterior sclerite.

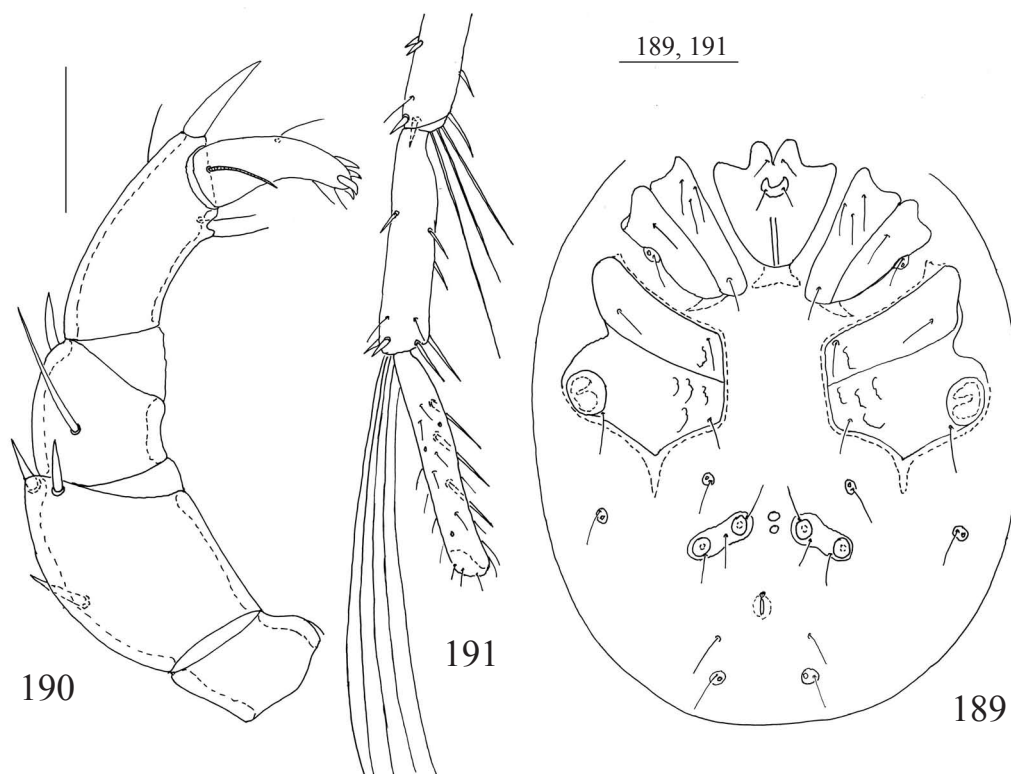
Capitulum, chelicerae and pedipalps as in female, but pedipalpal tibia with 3–7 dorsal setae.

Genu III (Fig. 186) shorter than tibia III, tarsus III and tibia III approximately equal in length; genu III with 3–4 relatively short, and tibia III with 6–8 long swimming setae. Telofemur IV (Fig. 187) short, genu IV greatly expanded dorsoventrally in proximal half with almost straight dorsal margin and very large ventral hump, bearing numerous dorsal and ventrodiscal setae and several relatively short lateral setae; dorsal setae longer

and thinner than ventrodiscal setae. Tibia IV nearly straight with a few rather long and thick dorsal setae, several short and thick ventral setae, a single thick dorsodistal peg-like seta and long distal swimming setae. Tarsus IV with numerous short and fine setae and 5–7 relatively long unequal thick dorsal setae.

Claw of legs I and II as in female. Claws of legs III (Fig. 188) asymmetrical, large claw with approximately subequal external and internal denticles, external denticle provided with thin spur; small claw with subequal external and internal denticles.

Measurements (n=10). Body length 530–735, length of medial margin of coxa III 65–80, length of medial margin of coxa IV 250–280; length of anteromedial dorsal plates 55–60, their width 20–25, length of genital plates 72–90, their general width 180–250; length/width of genital acetabula (*ac.* 1–3): 36–48/30–36, 42–48/36–42, 37–55/30–42; length of basal segment of chelicerae 105–155; length of cheliceral stylet 40–57; length of pedipalpal segment (P-1–5): 32–40, 90–120, 50–65, 95–125, 40–55; length of distolateral spine on tibia 18–21; length of leg segments: I–Leg. 1–6: 55–75, 80–125, 90–130, 115–170, 130–190, 185–255; II–Leg. 1–6: 65–80, 85–130, 90–140, 120–175, 130–195, 185–245; III–Leg. 1–6: 75–100, 80–125, 55–90, 80–125, 120–180, 145–205; IV–Leg. 1–6: 120–155, 90–145, 60–100, 145–195, 180–235, 180–235.



Figs 189–191. *Tiphys latipes*, deutonymph: 189 — ventral view, 190 — pedipalp, 191 — genu, tibia and tarsus of leg IV. Scale bars = 100.

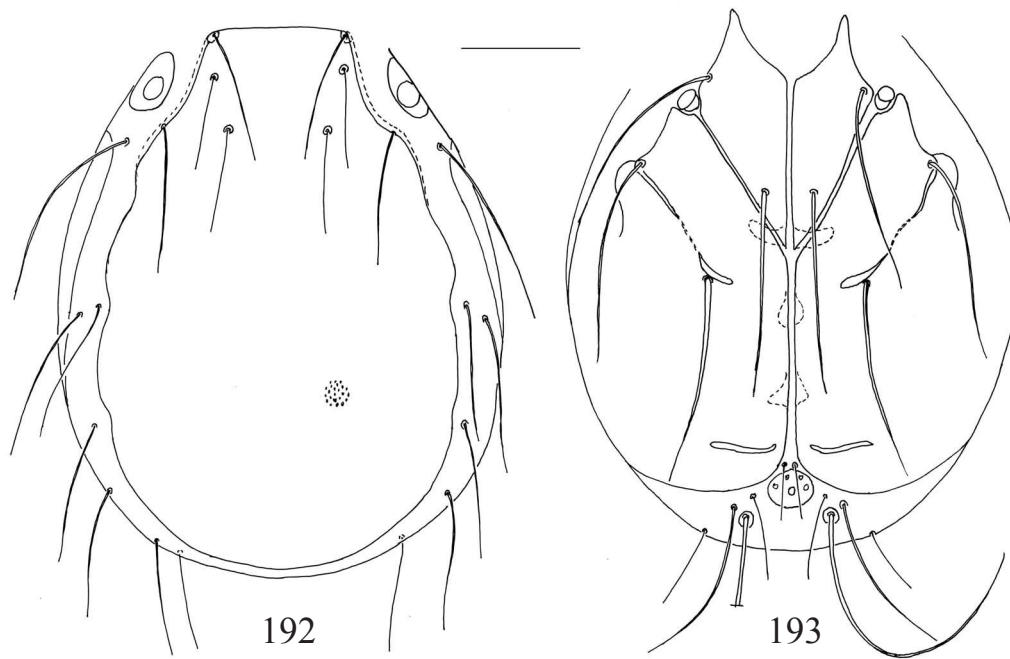
Deutonymph. Dorsum without true dorsal plates. Setae *Fch* long, thin. Coxal plate I usually with 3 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 1 lateral thin setae, coxal plate III with 1 medial seta and 1–2 lateral thin setae, coxal plate IV with 1 medial seta and 1 lateral seta (Fig. 189). Apodeme of coxal plate I moderately developed and not reaching medial margin of coxal plate III. Suture line between coxal plates III and IV oblique, directed posteromedially. Medial margin of coxae III slightly longer than medial margin of coxae III. Posteromedial angle of coxae IV obtuse, with rather long apodeme. Sclerites bearing setae *Hv* fused with posterior margin of coxae II, setae *Pe* and other ventral idiosomal setae lying free in soft integument. Genital plates separated, oblique, directed anteromedially, bearing 2 acetabula and 3 short and fine setae each. Both acetabula approximately equal in size, distance between them usually more than one diameter of acetabulum. Genital and pregenital sclerites subequal, situated closely together and placed between anterior ends of genital plates. Excretory pore with very small anterior sclerite.

Pedipalpal trochanter without seta, femur with 1 dorsoproximal seta and 2 dorsodistal short setae (Fig. 190). Ventral margin of femur straight, ventral margin of genu concave. Pedipalpal genu

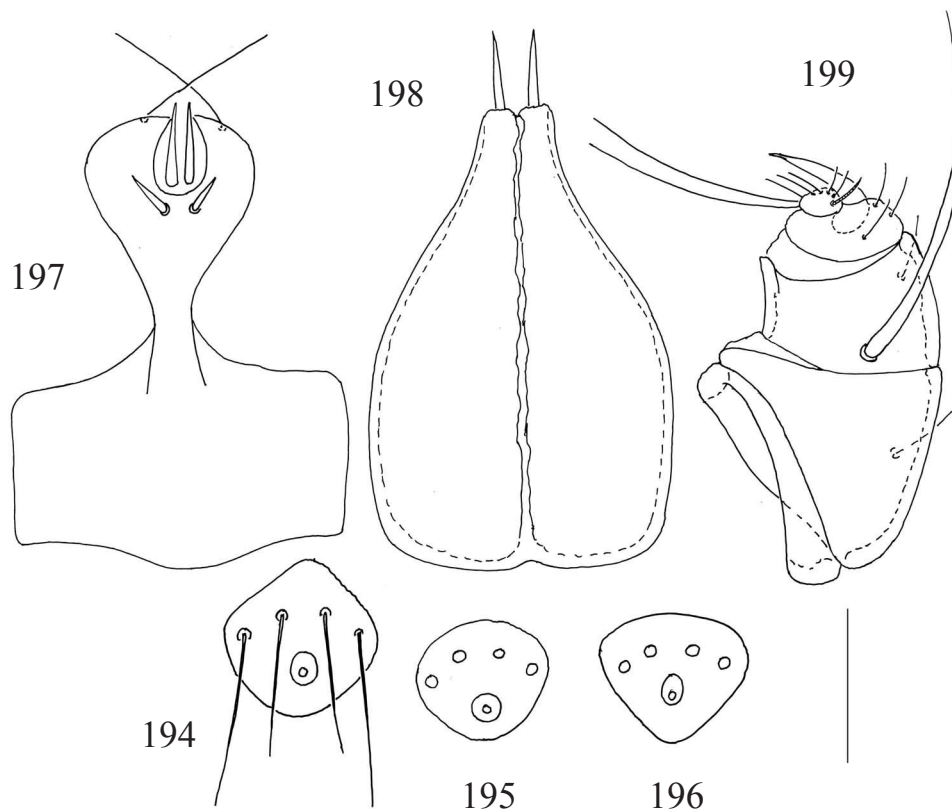
with 2 setae, external lateral seta considerably longer than dorsodistal seta; base of external lateral seta inserted proximally to middle of segment. Pedipalpal tibia with very long distolateral seta (0.6–0.7 times as long as tarsus), 2 ventral and 1–2 dorsodistal setae; base of ventral setae inserted on small tubercles near distal end of segment. Pedipalpal tarsus with long proximal solenidion, 3 thin setae and 4 thick and short distal spines.

Legs II–IV with swimming setae; second pair of legs with short swimming setae, two posterior pairs of legs with long swimming setae. One or two swimming seta present on genu legs II–IV and tibia II–III, 4–5 on tibia IV (Fig. 191). Claws of legs I–III larger than claws of legs IV; both denticles subequal in length, external denticle thin and pointed, internal denticle wide with rounded tip. Claw lamella slightly developed, with nearly straight ventral margin.

Measurements, $n=3$. Body length 420–570, length of medial margin of coxa III 30–35, length of medial margin of coxa IV 33–38; length of genital plates 60–66, width 24–30; diameter of genital acetabula (*ac.* 1–2): 18–21, 18–22; length of basal segment of chelicera 100–105; length of cheliceral stylet 33–36; length of pedipalpal segment (P-1–5): 24–327, 72–75, 42–48, 69–78; length of distolateral spine on tibia 28–32; length of leg segments:



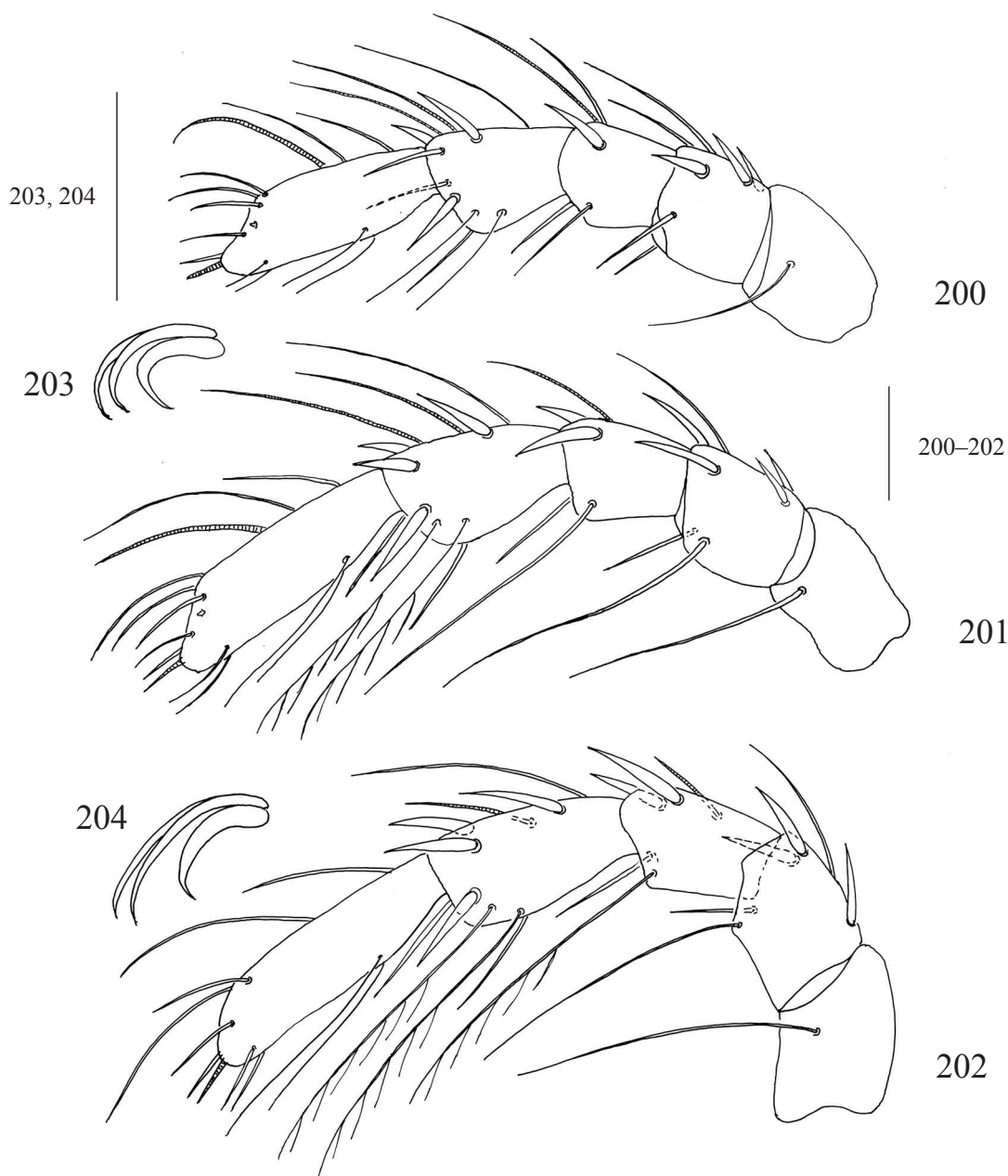
Figs 192–193. *Tiphys latipes*, larva: 192 — dorsal view, 193 — ventral view. Scale bar: 192–193 = 50.



Figs 194–199. *Tiphys latipes*, larva: 194–196 — excretory pore plate, 197 — capitulum (ventral view), 198 — chelicerae, 199 — pedipalp. Scale bar: 194–199 = 50.

I–Leg. 1–6: 42–48, 42–48, 57–60, 78–82, 90–96, 108–115; II–Leg. 1–6: 42–48, 48–54, 60–66, 81–87, 97–102, 115–123; III–Leg. 1–6: 50–54, 48–57, 54–60, 84–90, 112–115, 115–122, 180–195; IV–Leg. 1–6: 70–75, 60–66, 78–82, 105–110, 125–138, 130–145.

Larva. Body small and oval; dorsal shield truncated anteriorly, rounded posteriorly, with convex undulating lateral margins, anterolateral margins weakly concave near eye platelets (Fig. 192). Dorsal shield elongate (ratio length/width 1.5–1.6), covering almost complete dorsum in unengorged



Figs 200–204. *Tiphys latipes*, larva: 200 — leg I, 201 — leg II, 202 — leg III, 203 — claws of leg I, 204 — claws of leg III. Scale bars = 25.

larva and bearing only 2 pairs of trichobothria (*Fp*, *Oi*), setae *Fch* and *Vi* situated on subcutaneous extension of dorsal plate. Setae *Fch* and *Vi* subequal and longer than *Fp* and *Oi*. Setae *Oe*, *Hi*, *He*, *Sci*, *Sce* and *Li* located on soft wrinkled membrane. Setae *Oe* longest of all dorsal setae, setae *Hi* longer than setae *He*, setae *Sci* and *Sce* equal in length and slightly longer than *Li*. Lateral sides of coxae II+III coming onto dorsal side and lying beside setae *Oi* and other hysterosomal setae located on interscutal membrane. Dorsal shield porous.

Coxal plates I–II relatively small; anterior coxal plates separated from coxal plates II and III which fused, suture line between them incomplete

and developed only in their lateral parts (Fig. 193). Anterior margin of coxal plates I concave and nearly twice shorter than posterior margin. All coxal setae (C1–C4) long and subequal in length. Base of setae C4 on coxal plate III situated closely to medial end of suture line between coxal plates II and III. Posteromedial apodemes of coxal plates I relatively large, posteromedial apodemes of coxal plates II and III slightly developed. Transverse muscle attachment scar and posteromedial margin of coxal plate III separated. Setae *Ci*, *Si*, *Se*, *Le*, *Pi*, *Pe* situated on the soft interscutal membrane in the posterior part of the body. Setae *Ci* very long and thicker than all ventral idiosomal setae and situat-

ed on small bases; setae *Si* considerably shorter than setae *Se*. Coxal plates I–III porous. Urstigma have a lateral position on border between coxae I and II and provided with cups.

Excretory pore plate (Figs 194–196) slightly wider than long or nearly as long as wide, ratio length/width = 0.8–1.0, both pairs of setae situated in anterior half of plate, setae *Ai* shorter than *Ae*. Excretory pore open in posterior half of excretory pore plate.

Capitulum (Fig. 197) with wide base, anterior hypostomal setae longer and thinner than posterior setae. Basal segments of chelicerae (Fig. 198) fused at their medial parts and tapering proximally; suture line well developed along their whole length. Cheliceral stylet small, crescent-shaped.

Pedipalp trochanter (Fig. 199) short and without setae; dorsodistal seta of femur and genu of pedipalp short, thin and approximately equal in size, proximal lateral genual seta long and very thick; tibia with 3 approximately subequal short, thin setae and large dorsodistal claw. Pedipalpal tarsus with short solenidion, 2 long and 5 unequal simple setae.

All legs short and stout. General number of setae on legs I–III (Figs 200–202), except eupathidia, as follows: I–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); II–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5: 1, 6, 5(s), 10 (s), 11 (ac). Formula of large setae on leg segments as follows: I–Leg 1–5: 0, 3, 1, 2, 0; II–Leg 1–5: 0, 2, 2, 4, 0; III–Leg 1–6: 0, 2, 2, 4, 0. Solenidion on genu of leg I slightly longer than distal solenidia on tibia I, which is approximately subequal in length; solenidion on genu II shorter than proximal solenidion on tibia II, the latter slightly shorter than distal solenidion on tibia II; solenidion on genu of leg III shorter than solenidion on tibia III. Central claw on tarsi of all legs shorter than lateral claws (Figs 203–204); on tarsi of legs I and II empodia hook-like, on tarsus III empodium only slightly bent.

Measurements (n = 10). Length of dorsal shield 214–220, width 130–140; length of excretory pore plate 16–19, width 19–23; length of capitulum 67–70; length of basal segment of chelicera 67–70, length of cheliceral stylet 14–16; length of medial margin of coxae I 64–70, length of medial margin of coxae II+III 83–95; length of pedipalpal segments (P-I-5): 5–6, 25–29, 18–21, 6–7, 4–5; length of legs segments: I–Leg. 1–5: 25–29, 18–22, 22–26, 30–33, 40–43; II–Leg. 1–5: 31–33, 26–29, 25–29, 38–41, 49–53; III–Leg. 1–5: 32–35, 26–29, 28–33, 41–46, 70–75.

Ecology. Temporary ponds, sedge bogs, sedge-sphagnum bogs, springs, lakes. Also in permanent waters.

Geographical distribution. Europe (Viets 1936 1956; Sokolow 1940; Lundblad 1968; K.O. Viets 1978), Asia, Russia: Magadan Province.

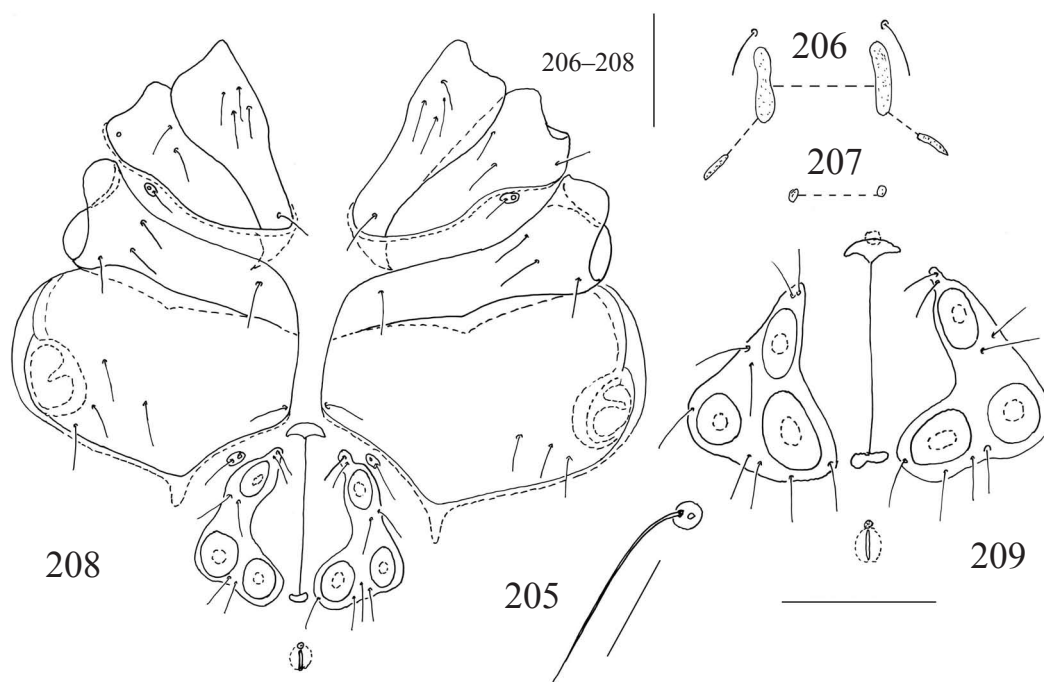
***Tiphys (Tiphys) kamchatkaensis* sp.n.**

Figs 205–213

Material. Holotype male (IBIW 4601): Asia, Russia, Kamchatka Province, Ust'-Kamchatsk Distr., Ust'-Kamchatsk settlement: sedge-sphagnum bog on right bank of the Kamchatka river, 20 km upstream of the settlement, 26 June 1983, P.V. Tuzovsky. Paratypes: 2 females collected in some bog as holotype, 23 June 1983, P.V. Tuzovsky.

Diagnosis. Female. Medial margin of coxal plate IV longer than medial margin of coxal plate III. Posteromedial and posterolateral margins of coxae IV forming obtuse angle with short apodeme. Genital plates elongate and more or less triangular, with 3 acetabula and 7–9 short, fine setae each. Genital opening and genital plates approximately subequal in length, anterior and posterior genital sclerites slightly developed and approximately equal in width. Pedipalpal genu with 3 setae, external lateral seta shorter than dorsal margin of segment, and only slightly longer than other dorsal setae; base of external lateral seta situated proximally to middle of segment; tibia with moderately long distolateral spine (2.5 times as short as tarsus), both ventral setae located on small tubercles distally to middle of segment. Claws of legs I–III larger than claws of legs IV; both denticles approximately subequal in length, external denticle thinly-pointed, internal denticle wide and with rounded tip; claw lamella moderately developed with convex ventral margin.

Male. Coxae plates IV greatly expanded, fused with one another along whole medial margins, abruptly depressed posteromedially. Posterior margin of coxal plate IV nearly transverse. Medial margin of coxal plate IV 4.8 times longer than medial margin of coxal plate III. Suture line between coxal plates III and IV complete, slightly oblique, directed posteromedially. Genital plates triangular, fused medially. Anterior genital sclerite small transverse with two pairs of short, fine setae and fused with genital plates. Genu III with 3, tibia III with 4 long swimming setae. Genu IV greatly expanded dorsoventrally with maximum height in the middle of segment, tibia IV nearly straight with lance-shaped and pointed dorsodistal seta



Figs 205–209. *Tiphys kamchatkaensis*, female: 205 — seta *Fch*, 206 — anteromedial and anterolateral dorsal plates, 207 — posteromedial plates, 208 — ventral view, 209 — genitoanal area. Scale bars: 205 = 50, 206–208 = 100, 209 = 75.

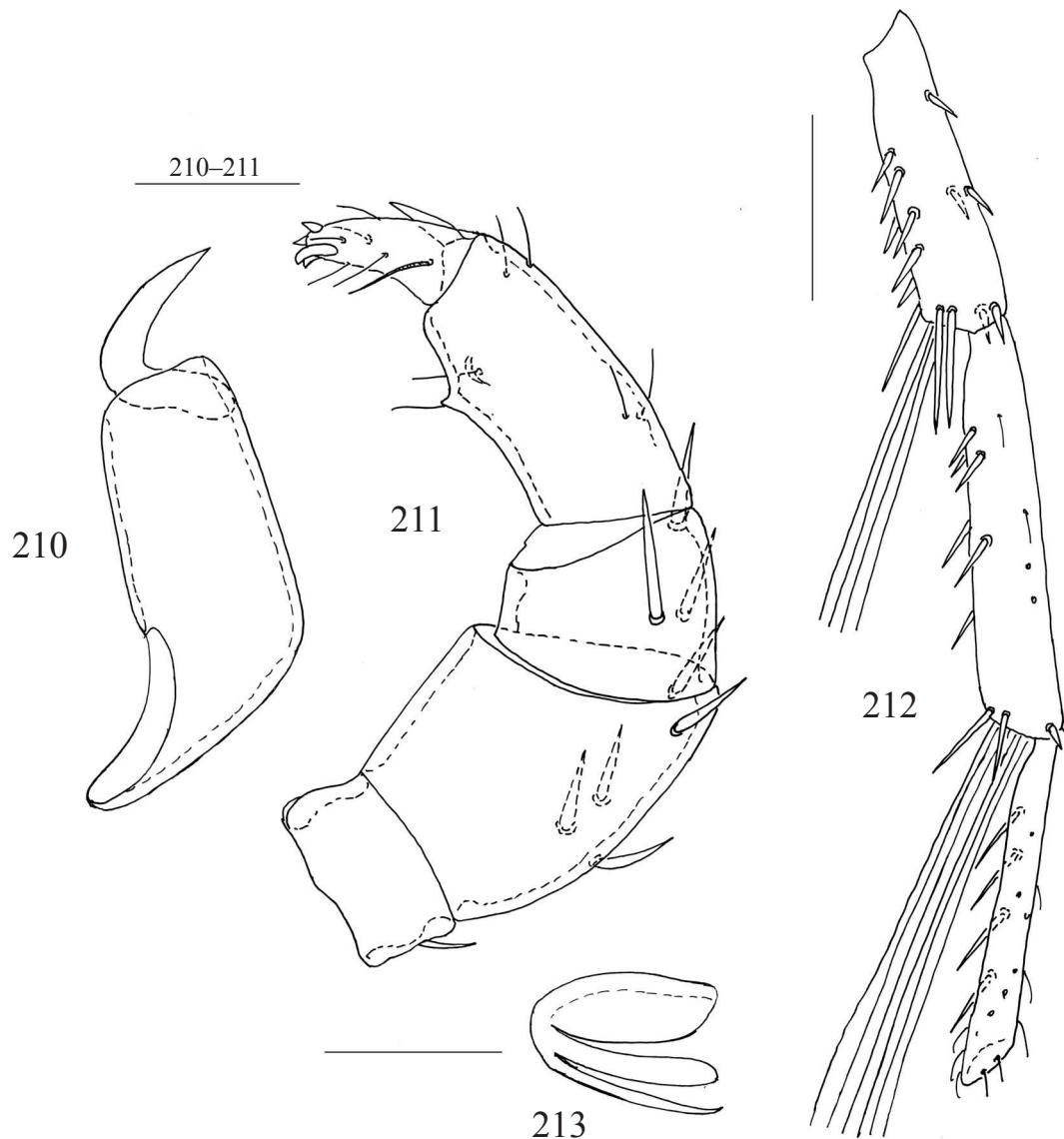
and with 10–12 long distal swimming setae. Tarsus and tibia of leg IV nearly subequal in length. Claws of legs III asymmetrical: large claw with two denticles, external denticle larger than internal one and provided with thin dorsal spur; small claw with two short stout denticles, external denticle larger than internal one and bearing very short and thin spur.

Differential diagnosis. The new species is closely related to *T. latipes*. The male of *T. kamchatkaensis* sp. n. differs from the male of *T. latipes* by the following characters (character states of the male of *T. latipes* are given in parentheses): setae *Hv* and *Pe* are lying free in soft integument, Fig. 214, (seta *Hv* fused with posterior margin of coxa II, seta *Pe* fused with posteromedial margin of coxa IV, Fig. 185); genu IV is expanded dorsoventrally with maximum height near middle of segment, Fig. 216 (in proximal portion, Fig. 187); tibia IV with a relatively long lance-shaped dorso-distal seta (Fig. 217) (with short peg-like seta, Fig. 187), small claw of leg III has two unequal denticles, external denticle is considerably larger than internal one and with very short spur (Fig. 218) (with two subequal denticles, external denticle without spur, Fig. 188). The female of *T. kamchatkaensis* sp. n. differ from the female of *T. latipes* by the following characters (character states of the female of *T. latipes* are given in parentheses): the genital plates is crescent, Fig. 208 (triangular, Figs 176–179), the lateral setae on P-3 shorter than

length of the segment, Fig. 211 (longer, Fig. 182), the posterior angle of coxal plates IV is obtuse, Fig. 208 (right or acute, Fig. 175).

Description. Female. Body oval; setae *Fch* long, whip-like (Fig. 205), other idiosomal setae filiform. Integument soft with very fine strips. Dorsum with relatively large anteromedial plates (Fig. 206), anterolateral and posteromedial platelets (Fig. 207) little developed. Coxal plate I usually with 4 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 3 lateral thin setae, coxal plate III with 1 medial seta and 3 lateral setae, coxal plate IV with 1 posteromedial seta and 3–4 lateral setae (Fig. 208). Apodeme of coxal plate I moderately developed. Suture line between coxal plates III and IV complete and slightly oblique, directed posteromedially. Medial margin of coxal plate IV longer than medial margin of coxal plate III. Posteromedial and posterolateral margins of coxae IV forming obtuse angles with short apodemes. Sclerites bearing seta *Hv* close to posteromedial margin of coxa II, other idiosomal setae lying free in soft integument.

Genital plates elongate (Fig. 208), lying in an arc or nearly triangular (Fig. 209) with 3 acetabula and 7–9 short and fine setae each. All acetabula small and approximately of equal size, and usually arranged in triangular shape; acetabula occupy approximately about half area of genital plate; distance between first and second acetabula usually more than distance between second and third ac-



Figs 210–213. *Tiphys kamchatkaensis*, female: 210 — chelicera, 211 — pedipalp, 212 — genu, tibia and tarsus of leg IV, 213 — claw. Scale bars: 210 = 100, 213 = 50.

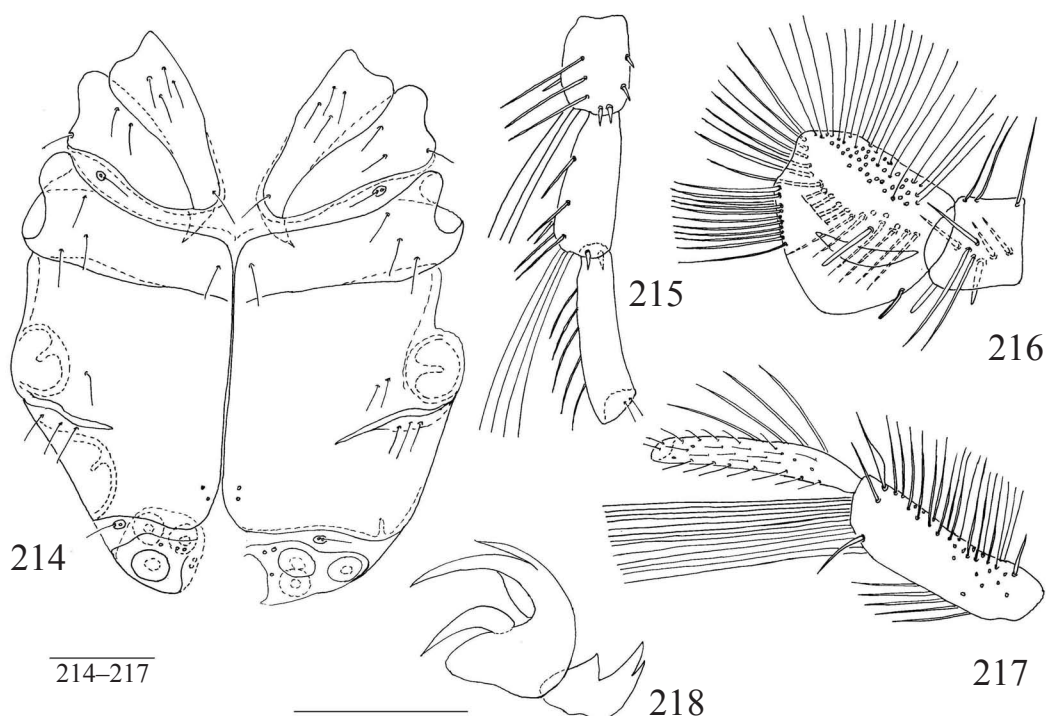
etabula. Genital opening and genital plates approximately equal in length, anterior and posterior genital sclerites slightly developed and approximately equal in width. Excretory pore with very small anterior sclerite.

Capitulum with short anchoral projection, both pairs of setae equal in length. Basal segment of chelicera narrow and curved proximally, straight distally (Fig. 210). Cheliceral stylet relatively large, pointed.

Pedipalpal trochanter with a single short dorsodistal seta, femur with 3 proximal and 2 dorsodistal setae (Fig. 211); ventral margin of femur and genu straight. Pedipalpal genu with 3 short setae, external lateral seta shorter than dorsal margin of segment and only slightly longer than other dorsal setae; base of external lateral seta situated proximally to middle of segment. Pedipalpal tibia with

rather long distolateral seta, 2 ventral setae and several short and fine dorsal setae; both ventral setae located distally to middle of segment on small tubercles. Distolateral seta of tibia approximately 2.5 times shorter than tarsus. Pedipalpal tarsus tapering distally with 1 long proximal solenidion, 5 thin setae and 4 thick distal unequal spines.

Legs II–IV with swimming setae; second pair of legs with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 212). Two swimming setae present on genu and tibia of legs II, 2–3 on genu III, 3–4 on genu IV and tibia III, 5–6 on tibia IV. Claws of legs I–III larger, than claws of legs IV; both denticles approximately subequal in length, external denticle thin and pointed, internal denticle wide with rounded tip (Fig. 213). Claw lamella moderately developed with slightly convex ventral margin.



Figs 214–218. *Tiphys kamchatkaensis*, male: 214—ventral view, 215—genu, tibia and tarsus of leg III, 216—telofemur and genu of leg IV, 217—tibia and tarsus of leg IV, 218—claws of leg III. Scale bars: 214–217 = 100, 218 = 25.

Measurements (n=2). Body length 600–650; length of medial margin of coxa III 50–55, length of medial margin of coxa IV 75–80; length of anteromedial dorsal plates 54–60, width 15–20; length of genital plates 77–90, width 45–50; length/width of genital acetabula (*ac.* 1–3): 36–43/23–30, 36–42/25–30, 35–42/30–36; width of anterior genital sclerite 35–42; length of basal segment of chelicera 90–95, length of cheliceral stylet 30–33; length of pedipalpal segment (P-1–5): 28–30, 72–78, 44–56, 77–85, 30–35; length of distolateral spine on tibia 20–21; length of leg segments: I–Leg. 1–6: 45–48, 65–72, 70–73, 83–90, 97–102, 110–115; II–Leg. 1–6: 47–50, 65–72, 75–78, 90–95, 105–112, 115–125; III–Leg. 1–6: 50–60, 70–75, 72–78, 88–95, 115–130, 115–120; IV–Leg. 1–6: 75–85, 80–85, 90–100, 130–140, 150–165, 140–150.

Male. Dorsal surface, capitulum, chelicerae and pedipalps as in female. Anterior apodemes rather large, extending beyond medial margin of coxal plate III; posterior apodemes little developed (Fig. 214). Coxae plates IV greatly expanded, fused with one another along whole medial margins, abruptly depressed posteromedially, with 2 short and fine setae anterior to depressed region on each plate. Posterior margin of coxal plate IV nearly transverse. Medial margin of coxal plate IV 4.8 times longer than medial margin of coxal plate III. Suture line between coxal plates III and IV com-

plete, oblique, directed posteromedially. Genital plates triangular, all acetabula approximately equal in size and occupying less than half the area of the plates. Anterior genital sclerite small, with two pairs of short, fine setae and fused with genital plates. Genital plates with 4–5 short, fine setae each. Sclerites, bearing setae *Hv*, *Pe* and other idiosomal setae lying free in soft integument.

Genu III (Fig. 215) considerably shorter than tibia III, tarsus III slightly longer than tibia III; genu III with 3 and tibia III with 4 long swimming setae.

Telofemur IV (Fig. 216) considerably shorter than genu IV. Genu IV greatly expanded dorsoventrally, with almost straight dorsal margin and large ventral hump with maximum height in middle of segment, bearing numerous dorsal and ventrodiscal setae, and several relatively short lateral setae; dorsal setae very numerous and longer than ventrodiscal setae. Tibia IV (Fig. 217) nearly straight, with numerous thin dorsal setae, lance-shaped pointed dorsodiscal seta, several rather thick ventral setae, and 10–12 long distal swimming setae. Tarsus and tibia IV nearly equal in length, with numerous short, fine setae and 4 relatively long unequal thick, dorsal setae.

Claw of legs I and II as in female. Claws of legs III (Fig. 218) asymmetrical, large claw with two rather long denticles, external denticle with a thin dorsal spur and longer than internal denticle;

small claw with two short and stout denticles, external denticle with short and thin spur and larger than internal denticle.

Measurements (n=1). Body length 510, length of medial margin of coxa III 60, length of medial margin of coxa IV 29; length of anteromedial dorsal plates 440–45, width 10–15, length of genital plates 55, their general width 135; length/width of genital acetabula (*ac.* 1–3): 30–36/27–34, 30–36/25–30, 36–42/30–33; length of basal segment of chelicera 145, length of cheliceral stylet 42; length of pedipalpal segments (P-1–5): 35, 99, 60, 108, 48; length of distolateral spine on tibia 18; length of leg segments: I–Leg. 1–6: 60, 78, 102, 132, 155, 205; II–Leg. 1–6: 70, 78, 108, 145, 160, 215; III–Leg. 1–6: 70, 60, 72, 90, 102, 170; IV–Leg. 1–6: 115, 95, 102, 170, 205, 210.

Deutonymph. Unknown.

Larva. Unknown.

Ecology. Sedge-sphagnum bog.

Geographical distribution. Asia, Russia: Kamchatka Province.

***Tiphys (Tiphys) kolymaensis* sp. n.**

Figs 219–245

Material. Holotype female (IBIW 2594): Russia, Magadan Province, Tenka Distr., Agrobasa: sedge-sphagnum bog on left bank of the Kolyma river, 1 km upstream of settlement, 26 June 1979, P.V. Tuzovsky. Paratypes: 5 females and 5 larvae reared in laboratory (IBIW): 2 females, 21 June 1979 and 3 females, 22 June 1979 collected in the same bog as holotype, P.V. Tuzovsky.

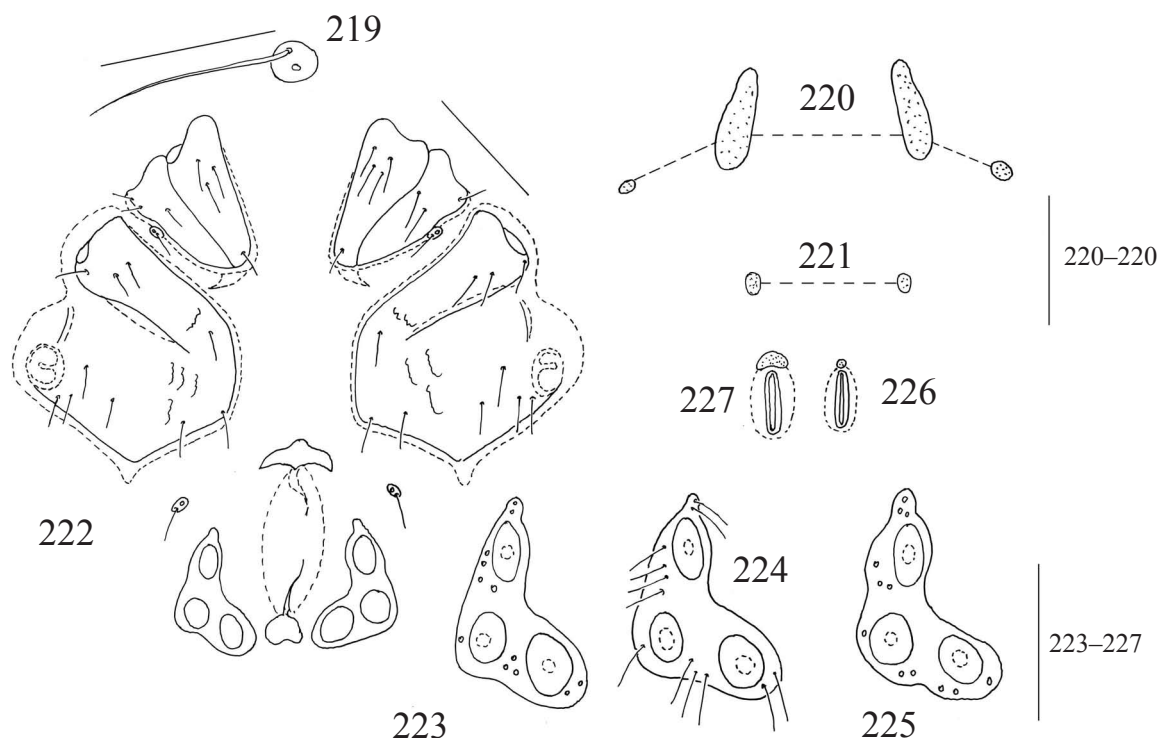
Diagnosis. Female. Dorsum with relatively large anteromedial plates, anterolateral and posteromedial platelets little developed. Suture line between coxal plates III and IV incomplete (obliterated medially), posteromedial and posterolateral margins of coxae IV forming obtuse angle with short apodeme. Sclerites bearing setae *Hv* fused with posteromedial margin of coxa II, other idiosomal setae lying free in soft integument.

Genital plates elongate and more or less triangular with 3 acetabula and 12–13 short, fine setae each. Pedipalpal genu with 3(2) setae (sometimes dorsoproximal seta absent), external lateral seta shorter than dorsal margin of segment, and only slightly longer than other dorsal setae; base of external lateral seta situated proximally to middle of segment. Pedipalpal tibia slender, both ventral setae situated on small tubercles distally to middle of segment; distolateral seta of tibia 3 times shorter than tarsus.

Larva. Dorsal shield elongate (ratio length/width 1.5–1.6), covering almost complete dorsum in unengorged larva. Setae *Fch* and *Vi* slightly longer than *Fp* and *Oi*. Setae C4 slightly longer than setae C1–C3 which approximately subequal in length. Base of setae C4 on coxal plate III situated slightly beneath medial end of suture line between coxal plates II and III. Transverse muscle attachment scar and posteromedial margins of coxal plates III fused to each other or slightly separated. Dorsal shield and coxal plates I–III porous. Excretory pore plate nearly circular, ratio length/width = 0.8–1.0, setae *Ae* longer than setae *Ai*; excretory pore situated in posterior half of excretory pore plate. Capitulum with wide base. Solenidion on genu of leg I and solenidia on tibia I approximately subequal in length; solenidion on genu II shorter than solenidia on tibia II, both these solenidia subequal, its bases well separated.

Differential diagnosis. The new species is similar to *T. scaurus*. The female and larva of *T. kolymaensis* sp. n. differ from the female and larva of *T. scaurus* by the following characters (character states of the female and larva of *T. scaurus* are given in parentheses): female — the suture line between coxal plates III and IV incomplete, obliterated medially, Fig. 222 (complete, Fig. 65), the pedipalpal genu with short lateral seta, Fig. 229 (with long lateral seta, Fig. 72), the lateral seta on P-3 located in the proximal half of segment (in distal half of segment); larva — the dorsal plate and coxal plates punctate, Figs 233–234 (with reticulation, Figs 84–85), the base of seta C-4 close to the suture line between coxal plates III and IV on each side (separated), seta C-4 is long, its tip reaching posterior margin of Cx–III (short, its tip not reaching posterior margin of Cx–III).

Description. Female. Body oval; setae *Fch* long, thin (Fig. 219), other idiosomal setae filiform. Integument soft with very fine strips. Dorsum with relatively large anteromedial plates, small anterolateral and posteromedial platelets (Figs 220–221). Coxal plate I with 4 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 3 lateral thin setae, coxal plate III with 1 medial seta and 2–3 lateral setae, coxal plate IV with 1–2 posteromedial setae and 4–5 lateral ones (Fig. 222). Apodeme of coxal plate I moderately developed and usually in mature specimens not reaching to medial margin of coxal plate III. Suture line between coxal plates III and IV incomplete (obliterated medially) oblique, directed posteromedially. Posteromedial and posterolateral margins of



Figs 219–227. *Tiphys kolymaensis*, female: 219 — seta Fch, 220 — anteromedial and anterolateral dorsal plates, 221 — posteromedial plates, 222 — ventral view, 223–225 — genital plate, 226–227 — excretory pore. Scale bars = 100.

coxae IV forming obtuse angle, with short apodeme beneath this angle. Sclerites, bearing setae *Hv*, fused with posteromedial margin of coxae II, other idiosomal setae situated on soft integument freely.

Genital plates more or less triangular, with 3 acetabula and 12–13 short, fine setae each. All acetabula small, oval and approximately equal in size, and usually arranged in an obtuse triangle; acetabula occupying about half the area of the genital plate; distance between first and second acetabula and distance between second and third acetabula usually less than length of one acetabulum (Figs. 223–225). Genital opening longer than genital plates, anterior genital sclerites larger than posterior sclerite. Excretory pore with small anterior sclerite (Figs 226–227).

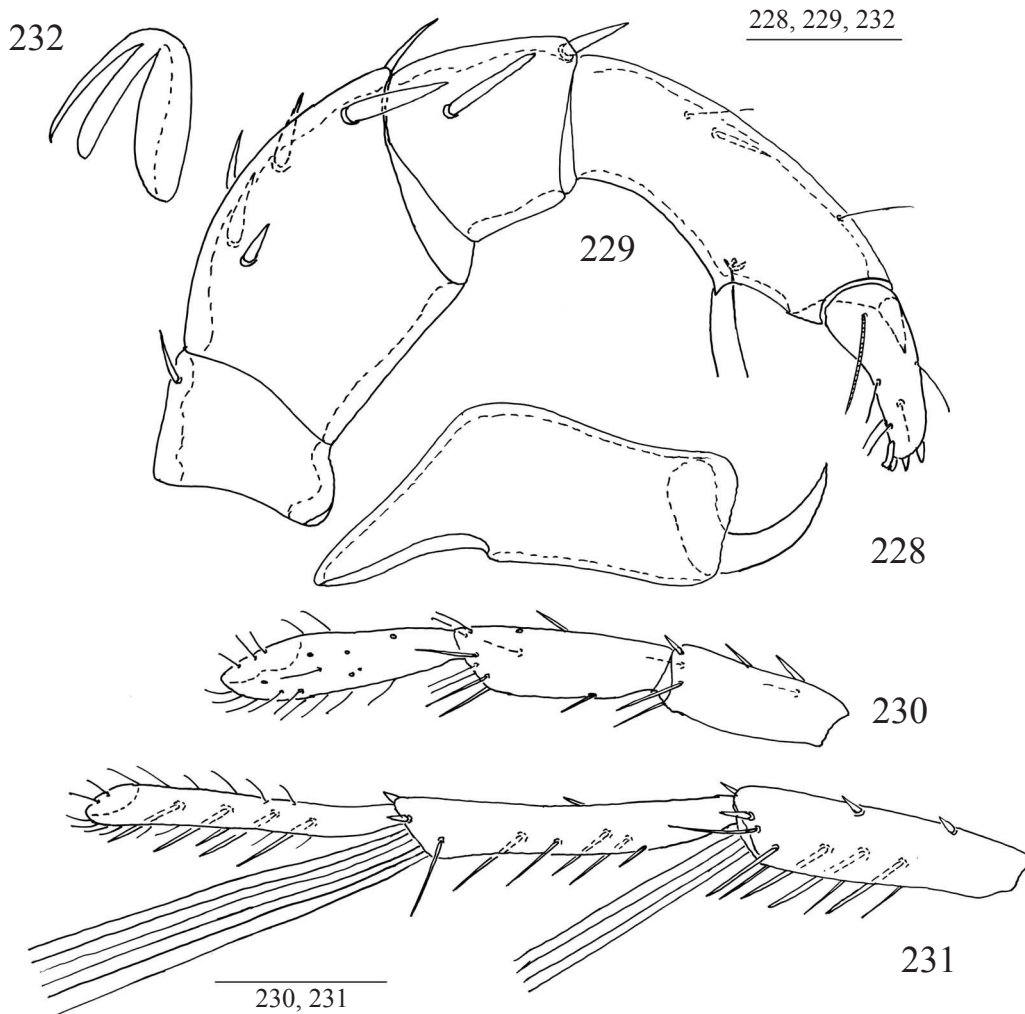
Capitulum with rather long anchoral processes, both pairs of setae equal in length. Basal segment of chelicera (Fig. 228) with large dorsal hump. Cheliceral stylet relatively large, pointed.

Pedipalpal trochanter with a single short dorsodistal seta, femur with 4 proximal and 2 unequal dorsodistal setae (Fig. 229). Ventral margin of femur straight, ventral margin of genu straight or slightly concave. Pedipalpal genu with 3(2) setae (occasionally dorsoproximal seta absent), external lateral seta shorter than dorsal margin of segment, and only slightly longer than other dorsal setae;

base of external lateral seta located proximally to middle of segment. Pedipalpal tibia slender with relatively short distolateral peg-like spine (3 times shorter than tarsus), 2 ventral setae, 2–3 thin dorsal ones and 1 dorsal seta proximally to middle of segment. Both ventral setae located on small tubercles distally to middle of tibia. Pedipalpal tarsus tapering distally with single long proximal solenidion, five thin setae and four short and thick distal unequal of different shape and length.

Leg I (Fig. 230) without swimming setae; legs II–IV with swimming setae, second pair of legs with short swimming setae, two posterior pairs of legs with long swimming setae (Fig. 231). Two or three swimming setae present on genu and tibia II, 3–4 on genu III and IV, 4–5 on tibia III, 5–7 on tibia IV. Claws of legs I–III larger, than claws of legs IV; both denticles approximately subequal in length, external denticle thin and pointed, internal denticle wide with rounded tip (Fig. 232). Claw lamella moderately developed with slightly convex ventral margin.

Measurements (n=6). Body length 670–1190, length of medial margin of coxa III+IV 125–140; length of anteromedial dorsal plates 60–65, width 15–18, length of genital plates 115–130, width 55–66; length/width of genital acetabula (*ac.* 1–3): 39–42/18–24, 36–42/27–30, 45–48/30–36; width of anterior genital sclerite 60–84; length of basal



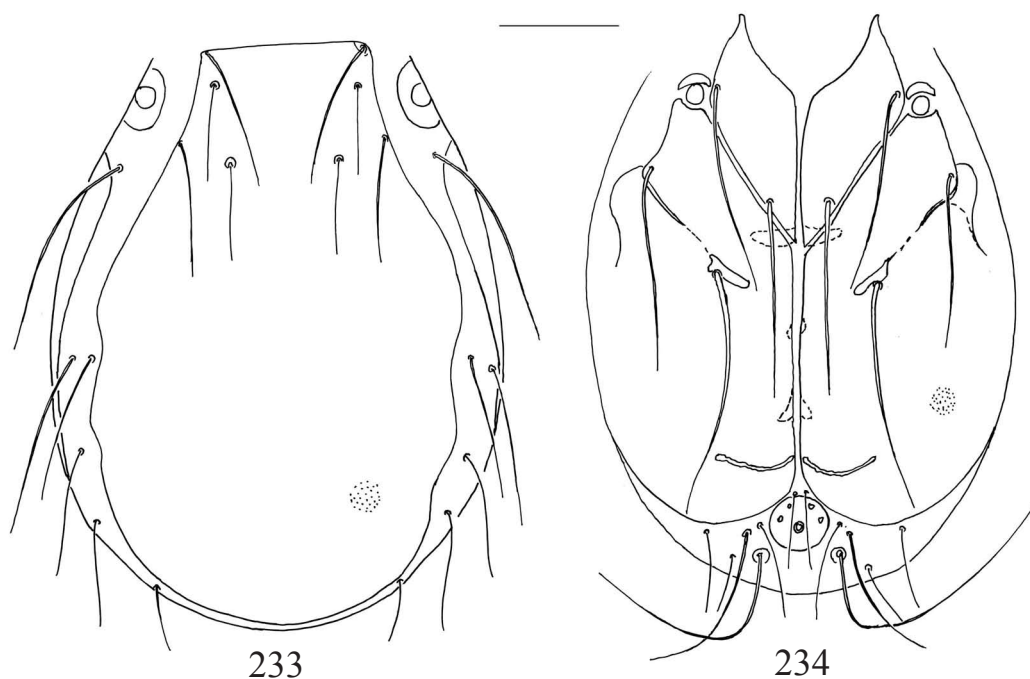
Figs 228–232. *Tiphys kolymaensis*, female: 228 — chelicera, 229 — pedipalp, 230 — genu, tibia and tarsus of leg I, 231 — genu, tibia and tarsus of leg IV, 232 — claw. Scale bars: 228, 229, 232 = 50, 230–231 = 100.

segment of chelicera 120–140, length of cheliceral stylet 48–51; length of pedipalpal segment (P-1–5): 36–42, 102–108, 60–66, 108–115, 50–54; length of distolateral spine on tibia 17–18; length of leg segments: I–Leg. 1–6: 60–65, 70–78, 95–105, 120–126, 135–145, 155–165; II–Leg. 1–6: 65–72, 78–85, 105–110, 130–140, 150–157, 160–165; III–Leg. 1–6: 75–80, 75–85, 100–110, 125–135, 160–165, 160–165; IV–Leg. 1–6: 105–110, 95–105, 130–140, 185–195, 215–225, 200–210.

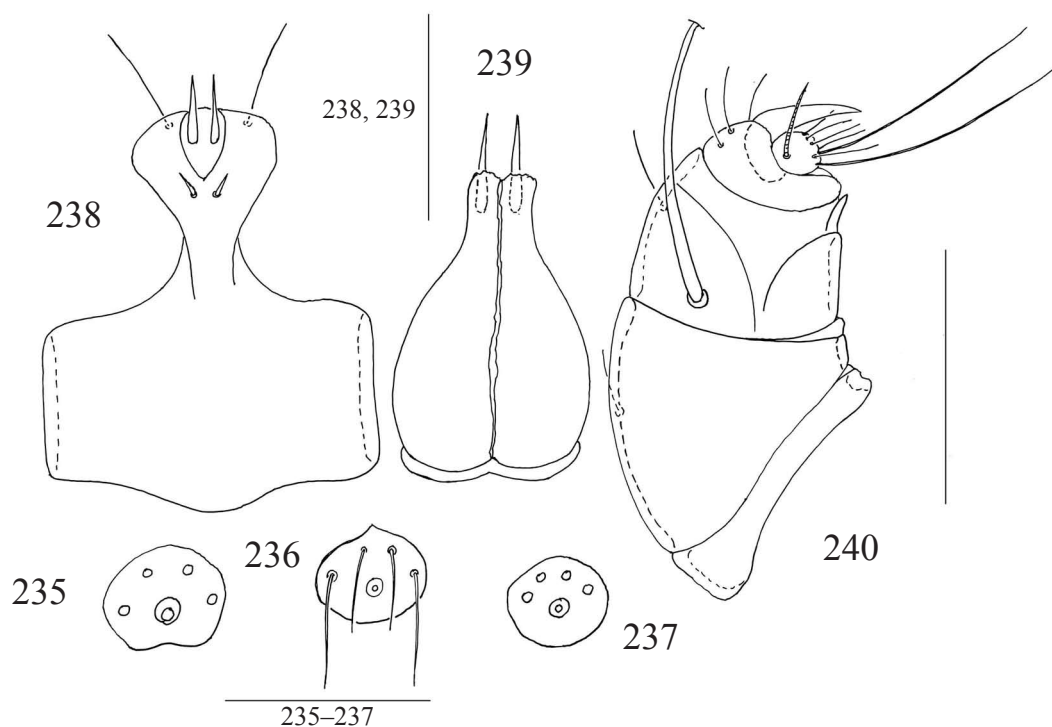
Larva. Body small and oval; dorsal shield truncated anteriorly, rounded posteriorly, with convex undulating lateral margins (Fig. 233). Dorsal shield elongate (ratio length/width 1.5–1.6), covering almost complete dorsum in unengorged larva and bearing 2 pairs of trichobothria (*Fp*, *Oi*) and 2 pairs of simple setae (*Fch*, *Vi*). Setae *Fch* and *Vi* slightly longer and thicker than *Fp* and *Oi*. Setae *Oe*, *Hi*, *He*, *Sci*, *Sce* and *Li* located on the soft wrinkled membrane. Setae *Oe* longest of dorsal setae, setae *Hi* longer than setae *He*, setae *Sce*

twice as long as *Li*. Lateral sides of coxae II+III passing onto dorsal side and almost extending to setae *Oi* and other hysterosomal setae located on interscutal membrane. Dorsal shield porous.

Coxal plates I–II relatively small; anterior coxal plates separated from coxal plates II and III, the latter fused to each other, suture line of coxal plates II and III incomplete and developed only in lateral parts (Fig. 234). Anterior margin of coxal plates I concave and considerably shorter than posterior one. Setae *C4* longer than setae *C1*–*C3*, the latter approximately equal in length. Base of setae *C4* on coxal plate III inserted closely to medial portion of suture line between coxal plates II and III. Posteromedial apodemes of coxal plates I well developed, posteromedial apodemes of coxal plates II rudimentary, and posteromedial apodemes of coxal plates III small. Transverse muscle attachment scar and posteromedial margins of coxal plates III fused or slightly separated. Setae *Ci*, *Si*, *Se*, *Le*, *Pi*, *Pe* situated on the soft interscutal



Figs 233–234. *Tiphys kolymaensis*, larva: 233 — dorsal view, 234 — ventral view. Scale bar: 233–234 = 50.



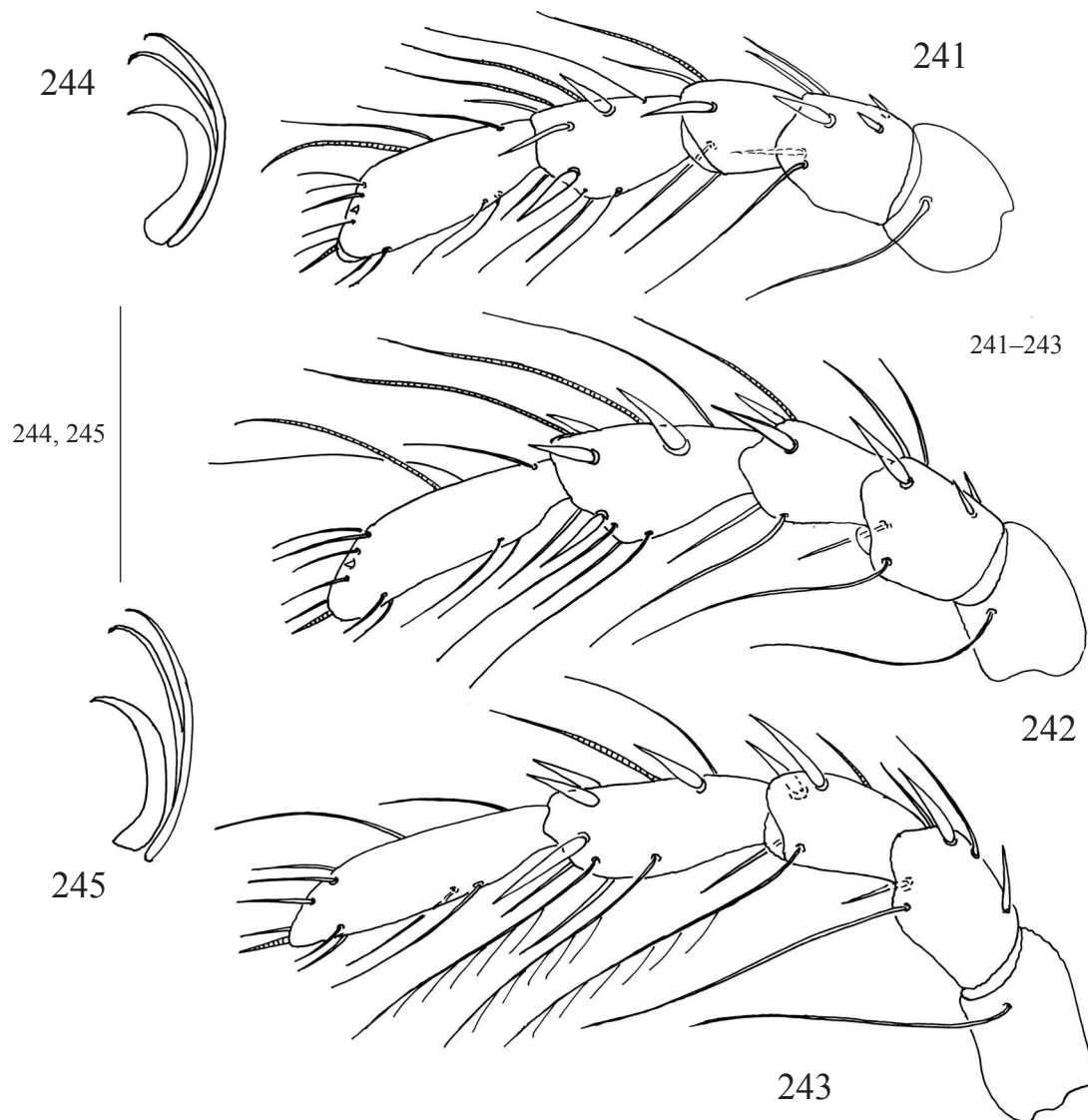
Figs 235–240. *Tiphys kolymaensis*, larva: 235–237 — excretory pore plate, 238 — capitulum (ventral view), 239 — chelicerae, 240 — pedipalp. Scale bars: 235–237, 240 = 25, 238–239=50.

membrane in posterior part of the body. Setae *Ci* very long and heaviest of all ventral idiosomal setae, and situated on small bases; setae *Si* shortest than *Se*. Coxal plates I–III porous. Urstigma occupying lateral position on the border between coxae I and II and provided with cups.

Excretory pore plate (Figs 235–237) wider than long or nearly circular, ratio length/width =

0.8–1.0. Setae *Ai* situated near anterior margin of excretory pore plate, and shorter than *Ae*. Excretory pore situated posteriorly to middle of excretory pore plate.

Capitulum (Fig. 238) with wide base, anterior hypostomal setae long and thin, posterior hypostomal seta short spine-like. Basal segments of chelicerae (Fig. 239) fused by their medial parts and



Figs 241–245. *Tiphys kolymaensis*, larva: 241 — leg I, 242 — leg II, 243 — leg III, 244 — claws of leg I, 245 — claws of leg III. Scale bars: 241–243 = 50, 244–245 = 25.

well tapering proximally, with concave posterior margins, lateral margins of these segments convex; suture line between segments distinctly developed along their whole length. Cheliceral stylet crescent-shaped, moderately in size.

Pedipalp trochanter (Fig. 240) short and without setae; dorsodistal setae of femur and genu of pedipalps thin, short and approximately equal in length, proximal lateral genual seta very long and heavy; tibia with 3 approximately subequal thin setae and large dorsodistal claw. Pedipalpal tarsus very small, with 1 rather long solenidion, 2 long and 5 unequal short setae.

Legs short and stout. The general number of setae on legs I–III (Figs 241–243), except eupathidia, is as follows: I–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); II–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5: 1, 6, 5(s), 10 (s), 11 (ac). For-

mula of large setae on leg segments as follows: I–Leg 1–5: 0, 3, 1, 2, 0; II–Leg 1–5: 0, 3, 2, 4, 0; III–Leg 1–6: 0, 2, 2, 4, 0. Solenidion on genu of leg I and solenidia on tibia I approximately subequal in length; solenidion on genu II shorter than solenidia on tibia II, both solenidia on tibia II equal in length; solenidion on genu of leg III short, solenidion on tibia III relatively long. Central claw on tarsi of all legs shorter than lateral claws (Fig. 244–245); on tarsi of legs I and II empodia hook-like, empodium on tarsus III only slightly bent.

Measurements (n=5). Length of dorsal shield 208–216, width 128–140; length of anal plate 20–22, width 22–24; length of capitulum 80–87; length of basal segment of chelicera 68–70, length of cheliceral stylet 15–16; length of medial margin of the coxae I 54–61, length of medial margin of the coxae II+III 89–97; length of pedipalpal seg-

ments (P-1-5): 7-8, 26-28, 19-21, 7-8, 5-6; length of legs segments: I-Leg. 1-5: 27-29, 19-20, 22-24, 28-32, 36-41; II-Leg. 1-5: 30-32, 22-25, 26-28, 34-38, 48-52; III-Leg. 1-5: 34-36, 24-30, 28-30, 40-45, 54-60.

Male. Unknown.

Deutonymph. Unknown.

Ecology. Sedge-sphagnum bog.

Geographical distribution. Asia, Russia: Magadan Province.

***Tiphys (Tiphys) torris* (Müller, 1776)**

Figs 246-282

Material. 2 females, 1 male and 1 deutonymph: Europe, Russia: Krasnodar territory, Seversk Distr., settlement Ubinskaya, brook, 9 May 1976, 18 females, 5 males, and 32 larvae reared in laboratory (IBIW), Russia, Yaroslavl Province, Nekouz Distr., village Postyltsevo, temporary ponds, sedge bogs and brook near the settlement, June-September 2000, 2006-2007, P.V. Tuzovsky; 1 female, 1 male: Spain, Aragon, Horta de San Juan, Nas de Clinto, 17 April 1998, R. Gerecke.

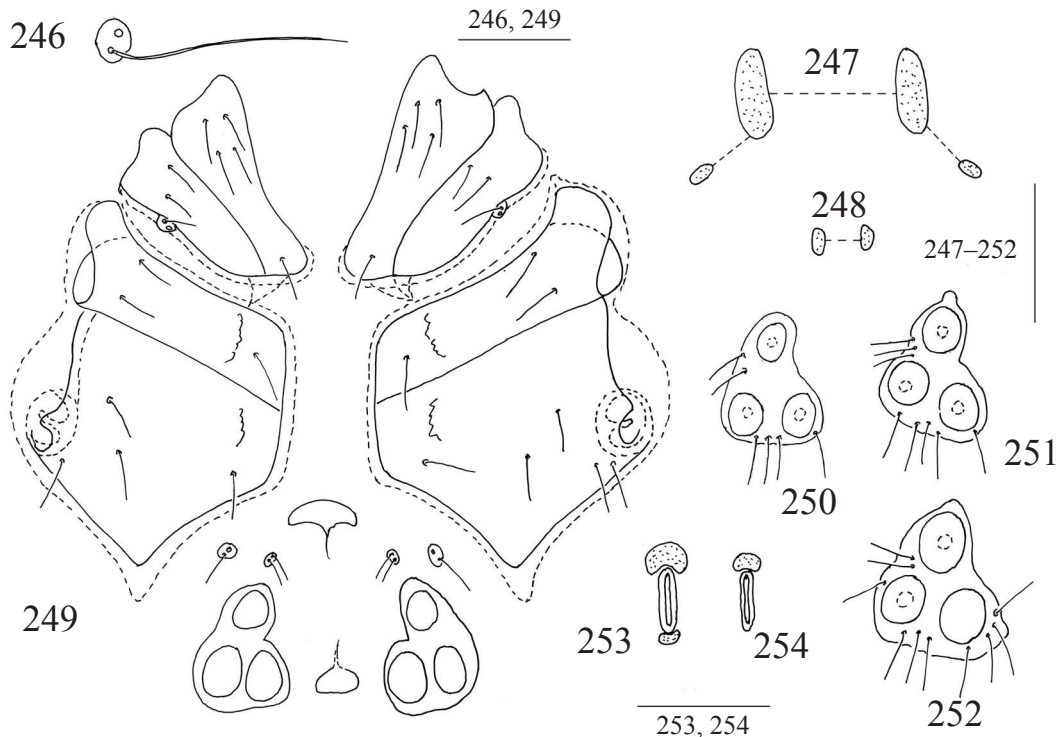
Diagnosis. Female. Medial margin of coxal plate III and medial margin of coxal plate IV subequal in length or last slightly longer than medial margin of coxal plate III. Sclerites, bearing setae *Hv*, fused with posteromedial margin of coxa II. Genital plates more or less triangular with 3 acetabula and 6-10 short and fine setae each; in addition usually 2-3 genital setae situated on soft integument between anterior genital sclerite and anterior ends of genital plates on each side. Pedipalpal genu usually with 3(4) setae, external lateral seta 2-3 times longer than other dorsal setae; base of external lateral seta situated distally to middle of segment; tibia with rather long distolateral seta (2.0-2.5 times shorter than tarsus), both ventral setae situated distally to middle of segment, external seta situated on a relatively large tubercle, internal seta on a small tubercle.

Male. Coxae plates IV greatly expanded, touching each other along whole medial margins, abruptly depressed posteromedially. Medial margin of coxal plate IV approximately twice as long as medial margin of coxal plate III. Suture line between coxal plates III and IV oblique, directed posteromedially. Genital plates triangular, fused medially, with 4-5 short, fine setae each. Sclerites bearing setae *Pe* fused with posteromedial margin of coxae IV; sclerites bearing setae *Hv* fused with posterior margin of coxae II. Genu of leg IV greatly expanded dorsoventrally with large rect-

angular ventroproximal corner. Tibia IV hardly curved with a large distal projection bearing 8-12 swimming setae and a single short peg-like seta. Tarsus of leg IV slightly longer than tibia, with numerous short and fine setae and 6-9 relatively long unequal thick dorsal setae. Both claws of legs III subequal, with three unequal denticles each.

Deutonymph. Medial margin of coxae III and medial margin of coxae III nearly subequal in length. Posteromedial angle of coxae IV moderately developed with rather long apodeme. Sclerites bearing setae *Hv* fused with posterior margin of coxae II. Genital plates with 2 acetabula and 3 short, fine setae each. Posterior acetabulum larger than anterior one, distance between these acetabula usually equal or more than diameter of anterior acetabulum on each plate. Postgenital and pregenital sclerites well separated, genital sclerite considerably large than pregenital sclerite. Excretory pore with very small anterior sclerite. Pedipalps stocky, genu with 2 setae, external lateral seta considerably longer than dorsodistal seta; base of external lateral seta situated distally to middle of segment; tibia short, with very long distolateral seta (0.75-0.80 times as long as tarsus), both ventral setae situated on small tubercles distally to middle of segment.

Larva. Dorsal shield elongate (ratio length/width 1.70-1.85), covering almost all dorsum in unengorged larva and bearing 4 pairs subequal setae. Setae *Oe* longer of all dorsal setae, setae *Sce* slightly longer than setae *Li*. Setae *C1* shorter than coxal setae *C2-C4*, base of setae *C4* on coxal plate III situated closely to medial end of suture line between coxal plates II and III. Posteromedial apodemes of coxal plates I well developed, posteromedial apodemes of coxal plates II and III little developed. Transverse muscle attachment scar present. Setae *Si* considerably shorter than setae *Se*. Dorsal shield and coxal plates I-III with reticulations. Excretory pore plate wider than long, anal setae situated near anterior margin of excretory pore plate, setae *Ai* located slightly in front of setae *Ae*, last longer than *Ai*; excretory pore open in posterior half of excretory pore plate. Tibia of leg I with 10 setae, solenidion on genu of leg I and distal solenidion on tibia I subequal in length, proximal solenidion on tibia I shorter than distal one; solenidion on genu of leg II and distal solenidion on tibia II approximately subequal in length, proximal solenidion on tibia II slightly shorter than distal solenidion.



Figs 246–254. *Tiphys torris*, female: 246 — seta *Fch*, 247 — anteromedial and anterolateral dorsal plates, 248 — posteromedial plates, 249 — ventral view, 250–252 — genital plate, 253–254 — excretory pore. Scale bars: 246–252 = 100, 253–254 = 50.

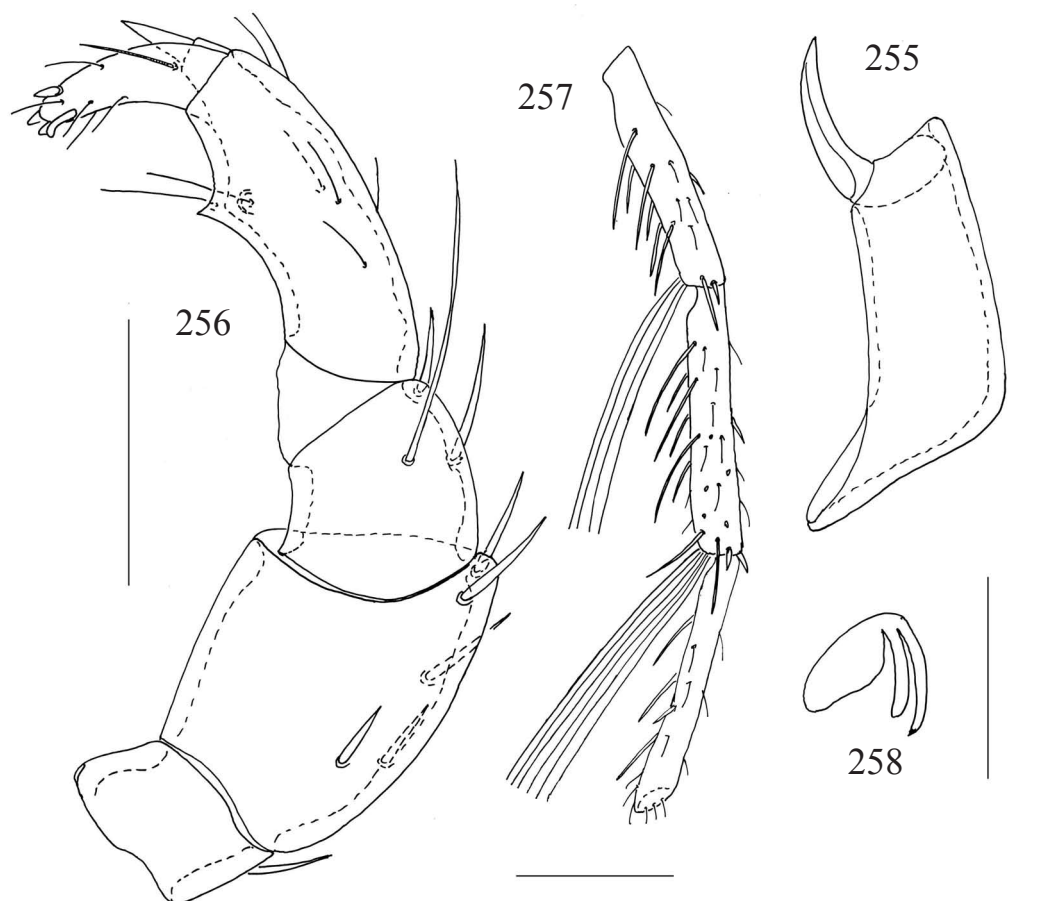
Description. Female. Body oval; setae *Fch* long, whip-like (Fig. 246), other idiosomal setae filiform. Integument soft and striated. Dorsum with relatively large anteromedial plates, small anterolateral and posteromedial platelets (Fig. 247–248). Anteromedial plates elongate, posteromedial plates and anteromedial platelets oval. Coxal plate I usually with 4(3) lateral thin setae and 1 posteromedial thin seta, coxal plate II with 2–3 lateral thin setae, coxal plate III with 1 medial seta and 2–3 lateral setae, coxal plate IV with 1 medial seta and 3–5 lateral setae (Fig. 249). Apodeme of coxal plate I moderately developed and usually not reaching medial margin of coxal plate III. Suture line between coxal plates III and IV complete and oblique, directed posteromedially. Medial margin of coxal plate III and medial margin of coxal plate IV subequal to or slightly longer than medial margin of coxal plate III. Posteromedial and posterolateral margins of coxae IV forming right angle, with short apodeme. Sclerites bearing setae *Hv* fused with posteromedial margin of coxa II, other idiosomal setae lying free in soft integument.

Genital plates (Figs 250–252) short, more or less triangular, with 3 acetabula and 6–10 short, fine setae each. In addition, usually 2–3 genital setae situated on soft cuticle between anterior genital sclerite and anterior ends of genital plates on

each side. All acetabula approximately equal in size, and arranged in a triangle; acetabula occupying about half or more than half of area of genital plate. Genital opening longer than genital plates, anterior genital sclerite moderately developed and larger than posterior one. Excretory pore usually with anterior and posterior sclerites, last smaller than anterior one (Fig. 253), but sometimes posterior sclerite absent (Fig. 254).

Capitulum with short anchoral projection, both pairs of setae equal in length. Chelicera (Fig. 255) with large basal segment, cheliceral stylet moderately developed, pointed.

Pedipalpal trochanter with single short dorso-distal seta, femur with 3–5 proximal and 2 dorso-distal setae; ventral margin of femur straight or slightly convex, ventral margin of genu slightly concave (Fig. 256). Pedipalpal genu usually with 3 (sometimes 4) setae, external lateral seta 2–3 times longer than other dorsal setae; base of external lateral seta inserted distally to middle of segment. Pedipalpal tibia slightly longer than femur, with rather long distolateral spine (2.0–2.5 times shorter than tarsus), 2 ventral setae and several short and fine dorsal setae; both ventral setae placed distally to middle of segment, external seta situated on relatively large tubercle, internal seta on a small tubercle. Pedipalpal tarsus tapering distally, with single long proximal solenidion, with 5



Figs 255–258. *Tiphys torris*, female: 255 — chelicera, 256 — pedipalp, 257 — genu, tibia and tarsus of leg IV, 258 — claw. Scale bars: 255 = 50, 256–257 = 100, 258 = 30.

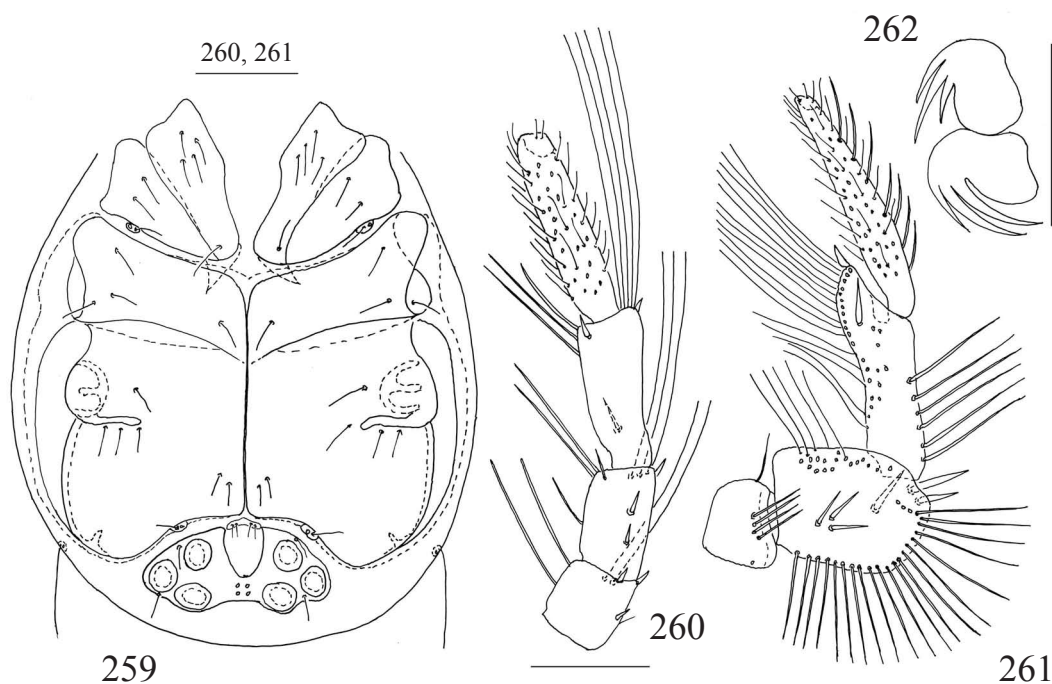
thin setae and 4 thick distal setae of different shape and length.

Legs II–IV with swimming setae; legs II with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 257). Two swimming seta present on genu of legs II, 2–3 on tibia II, 3–4 on genu III and IV, 3–6 on tibia III and IV. Claws of legs I–III are larger than claws of legs IV; external denticle longer than internal denticle (Fig. 258). Claw lamella moderately developed with nearly straight ventral margin.

Measurements (n=10). Body length 630–900, length of medial margin of coxa III 60–72, length of medial margin of coxa IV 70–90; length of anteromedial dorsal plates 36–45, width 18–25, length of genital plates 90–105, width 65–100; length/width of genital acetabula (*ac.* 1–3): 24–36/24–30, 29–36/24–30, 30–38/24–33; width of anterior genital sclerite 75–105; length of basal segment of the chelicera 120–140, length of the cheliceral stylet 48–60; length of pedipalpal segment (P-1–5): 30–40, 105–115, 65–75, 95–125, 40–60; length of distolateral spine on tibia 21–24; length of leg segments: I–Leg. 1–6: 55–65, 75–

110, 95–125, 130–155, 145–180, 155–190; II–Leg. 1–6: 55–75, 70–115, 95–130, 130–165, 150–180, 160–205; III–Leg. 1–6: 55–85, 85–115, 95–125, 145–165, 170–195, 170–195; IV–Leg. 1–6: 90–125, 95–140, 125–150, 180–205, 190–230, 190–220.

Male. Dorsal surface, coxae of legs I–III, capitulum, chelicera and pedipalps as in female. Anterior apodemes rather large, extending beyond medial margin of coxal plate III; posterior apodemes small (Fig. 259). Coxae plates IV greatly expanded, fused with one another along whole their medial margins, abruptly depressed posteromedially, with 2 short and fine setae close together anterior to depressed region on each plate. Posteromedial margin of coxal plate IV concave, posterolateral margin convex. Medial margin of coxal plate IV twice as long as medial margin of coxal plate III. Suture line between coxal plates III and IV oblique, directed posteromedially. Genital plates triangular, fused medially; all acetabula approximately subequal in sizes, and occupying about half of area of plates. Anterior genital sclerite small, with two pairs of short and fine setae.



Figs 259–262. *Tiphys torris*, male: 259— ventral view, 260 — telofemur, genu, tibia and tarsus of leg III, 261 — telofemur, genu, tibia and tarsus of leg IV, 262' — claws of leg III. Scale bars: 259–261 = 100, 262 = 25.

Genital plates with 4–5 short and fine setae each. Sclerites, bearing setae *Pe*, fused with posteromedial margin of coxae IV; sclerites bearing setae *Hv* fused with posterior margin of coxae II; other sclerites bearing ventral idiosomal setae situated on soft cuticle freely.

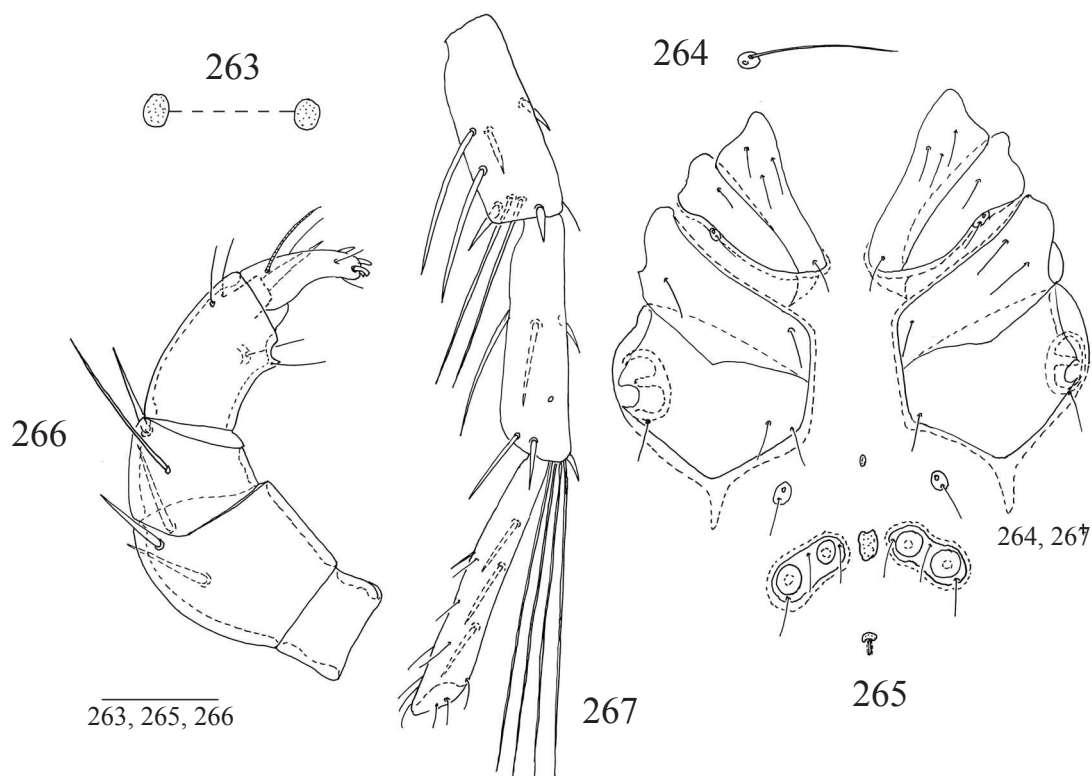
Telofemur III (Fig. 260) short, genu III shorter than tibia III, and tarsus III slightly longer than tibia III; telofemur III with 2, genu III with 3, and tibia III with 5–7 long swimming setae.

Genu IV (Fig. 261) strongly expanded dorsoventrally, with distinct rectangular ventroproximal corner, bearing rather numerous dorsal and ventral unequal setae and several relatively short thick lateral pointed setae; dorsal setae thicker than ventral ones. Tibia IV almost straight, with large distal projection bearing 8–12 swimming setae and single short peg-like seta, with a few dorsal and ventral setae. Tarsus IV slightly longer than tibia, with numerous short and fine setae and 6–9 unequal thick dorsal setae. Claw of legs I and II similar to female with two denticles. Both claws of legs III (Fig. 262) subequal in shape and size, with three unequal denticles each.

Measurements (n=6). Body length 485–510, length of medial margin of coxa III 70–90, length of medial margin of coxa IV 135–180; length of anteromedial dorsal plates 30–28, theirs width 18–24, length of genital plates 60–70, theirs general width 140–200; length/width of genital acetabula (*ac.* 1–3): 24–36/24–30, 30–36/24–30, 30–

38/24–32; length of basal segment of chelicera 105–140; length of cheliceral stylet 35–48; length of pedipalpal segment (P-1–5): 25–40, 80–90, 40–50, 80–90, 40–50; length of distolateral spine on tibia 15–25; length of leg segments: I–Leg. 1–6: 45–60, 70–95, 90–100, 120–125, 135–145, 190–215; II–Leg. 1–6: 45–65, 75–95, 95–105, 130–140, 150–165, 200–215; III–Leg. 1–6: 65–75, 85–95, 65–70, 75–85, 120–140, 160–170; IV–Leg. 1–6: 95–120, 90–110, 65–85, 145–155, 195–230, 230–245.

Deutonymph. Dorsum with I pair anteromedial dorsal plates only (Fig. 263), anterolateral and posteromedial platelets not developed. Setae *Fch* long, thin (Fig. 264). Coxal plate I usually with 3 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 1 lateral thin setae, coxal plate III with 1 medial seta and 1–2 lateral thin setae, coxal plate IV with 2 medial setae and 1 lateral one (Fig. 265). Apodeme of coxal plate I moderately developed, not extending beyond medial margin of coxal plate III. Suture line between coxal plates III and IV slightly oblique, directed posteromedially. Medial margin of coxae III and medial margin of coxae III nearly subequal in length. Posteromedial angle of coxae IV moderately developed, with rather long apodeme. Sclerites bearing setae *Hv* fused with posterior margin of coxae II; sclerites bearing setae *Pe* and other ventral idiosomal setae lying free in soft integument. Genital plates separated, oblique, directed anteromedi-



Figs 263–267. *Tiphys torris*, deutonymph: 263 — anteromedial dorsal plates, 264 — seta Fch, 265 — ventral view, 266 — pedipalp, 267 — genu, tibia and tarsus of leg IV. Scale bars: 263, 265–266 = 50; 264, 267 = 100.

ally, bearing 2 acetabula and 3 short and fine setae each. Posterior acetabulum larger than anterior one, distance between them usually equal or more than one diameter of anterior acetabulum on each plate. Postgenital and pregenital sclerites well separated, postgenital sclerite considerably larger than pregenital sclerite. Excretory pore with a very small anterior sclerite.

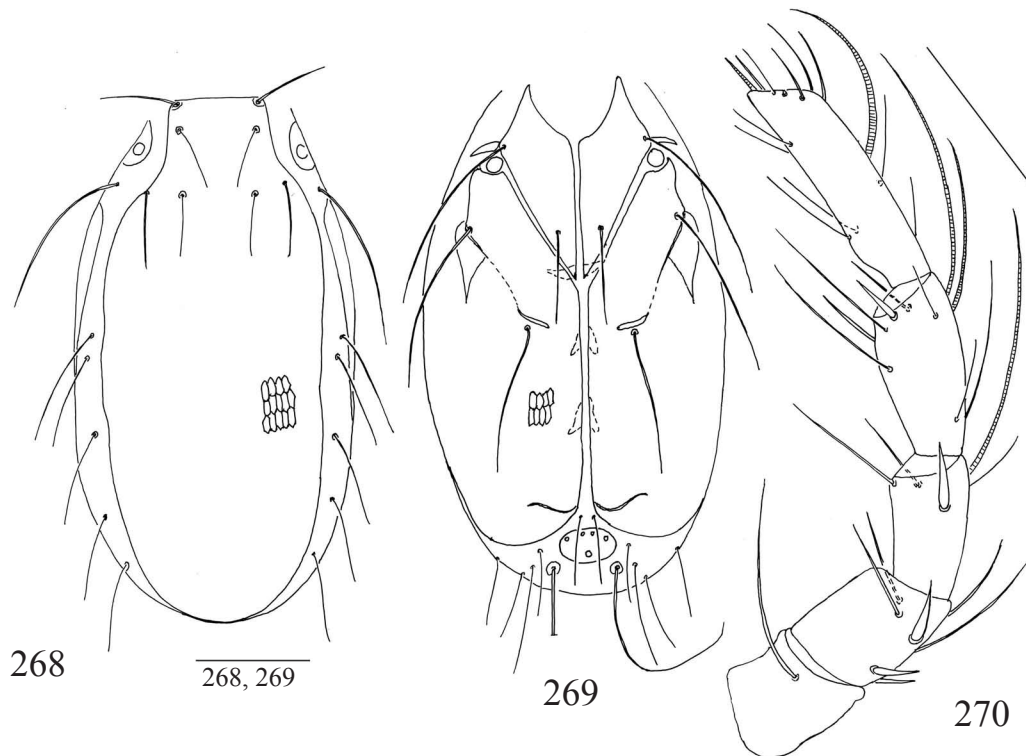
Pedipalpal trochanter without seta, femur with 1 dorsoproximal seta and 2 dorsodistal setae (Fig. 266). Ventral margin of femur straight. Pedipalpal genu with 2 setae, external lateral seta considerably longer than dorsodistal seta; base of external lateral seta situated distally to middle of segment. Pedipalpal tibia with very long distolateral spine, 2 ventral and 1–2 dorsodistal setae; both ventral setae situated on small tubercles distally to middle of segment; distolateral spine of tibia 0.75–0.80 of length of tarsus. Pedipalpal tarsus with single long proximal solenidion, 3 thin setae and 4 thick and short distal spines.

Legs II–IV with swimming setae; second pair of legs with short swimming setae, legs III–IV with long swimming setae (Fig. 267). Two swimming setae present on genu of legs II–IV and tibia II, 3 on tibia III, 4 on tibia IV. Claws of legs I–III larger, than claws of legs IV; both denticles approximately subequal in length, external denticle

thin and pointed, and internal denticle wide with rounded tip. Claw lamella well developed with convex ventral margin.

Measurements, $n=1$. Body length 445, length of medial margin of coxa III 36–45, length of medial margin of coxa IV 30–38; length of anteromedial dorsal plates 12, width 9; length of genital plates 60–66, their width 30; diameter of genital acetabula (*ac.* 1–2): 15–17, 21–23; length of basal segment of the chelicera 55, length of cheliceral stylet 30; length of pedipalpal segment (P-1–5): 24, 60, 35, 57, 30; length of distolateral spine on tibia 24; length of leg segments: I–Leg. 1–6: 35, 42, 60, 72, 90, 115; II–Leg. 1–6: 39, 54, 63, 84, 100, 120; III–Leg. 1–6: 42, 54, 63, 84, 108, 120; IV–Leg. 1–6: 60, 54, 72, 93, 108, 125.

Larva. Body small and oval; dorsal shield truncated anteriorly, rounded posteriorly, lateral margins undulating convex, anterolateral margins weakly concave (Fig. 268). Dorsal shield elongate (ratio length/width 1.70–1.85), covering almost complete dorsum in unengorged larva and bearing 4 pairs setae (*Fch*, *Fp*, *Vi*, *Oi*), all setae approximately equal in length but trichobothria *Fp* and *Oi* thinner than *Fch* and *Vi*. Setae *Oe*, *Hi*, *He*, *Sci*, *Sce* and *Li* located on the soft wrinkled interscutal membrane. Setae *Oe* longer of all dorsal setae, setae *Sce* and *Li* nearly equal in length. Lateral sides



Figs 268–270. *Tiphys torris*, larva: 268 — dorsal view, 269 — ventral view, 270 — Leg I. Scale bars: 268–269 = 50, 270 = 25.

of coxae II+III passing onto dorsal side and almost extending to setae *Oe* and other hysterosomal setae located on interscutal membrane. Dorsal shield with reticulations.

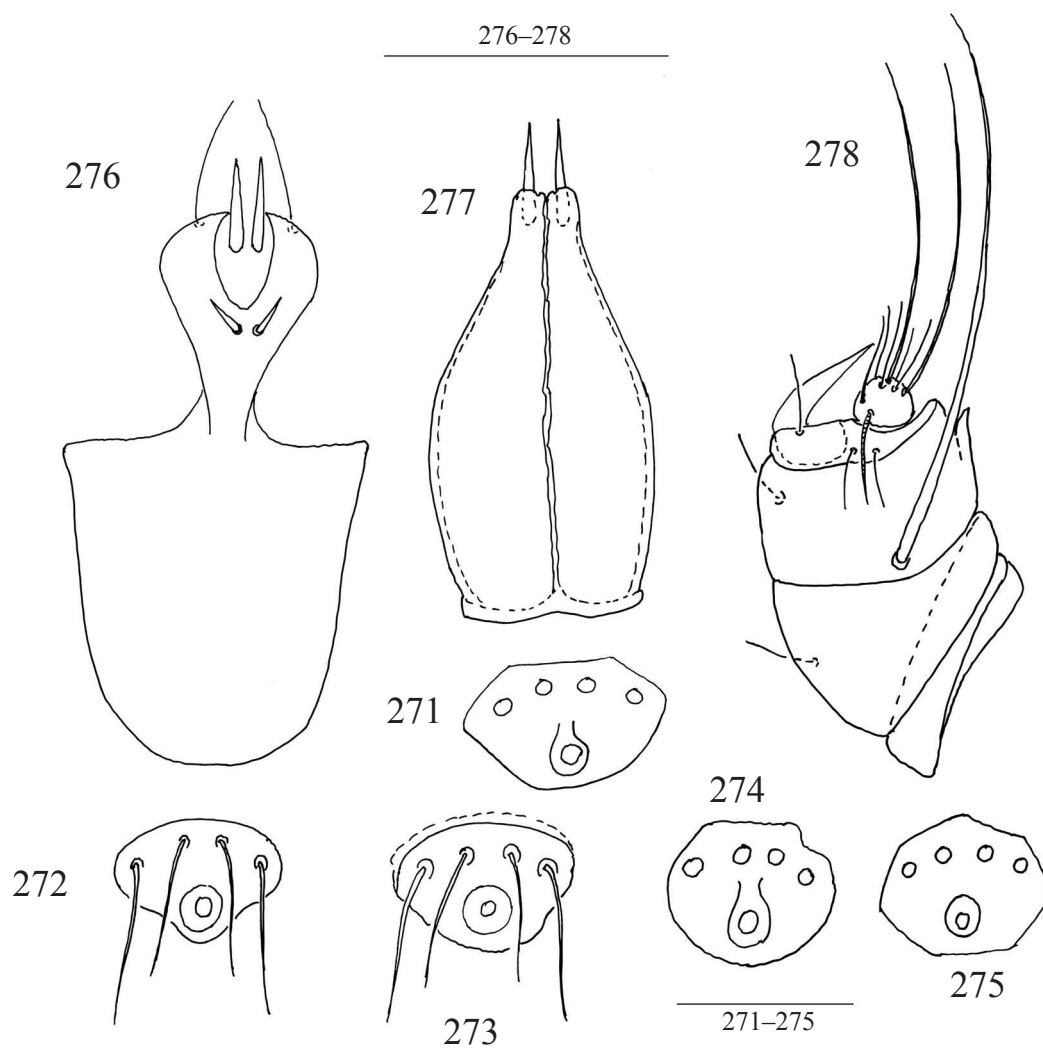
Coxal plates I–II relatively small; anterior coxal plates separated from coxal plates II and III which fused each other, suture line between them incomplete and developed only in their lateral parts (Fig. 269). Anterior margin of coxal plates I concave and considerably shorter than posterior one. Setae *C1* shorter than other coxal setae (*C2*–*C4*), base of setae *C4* on coxal plate III inserted closely to medial end of suture line between coxal plates II and III. Posteromedial apodemes of coxal plates I well developed, posteromedial apodemes of coxal plates II and III slightly developed. Transverse muscle attachment scar situated near posterior margin of coxal plate III. Setae *Ci*, *Si*, *Se*, *Le*, *Pi*, *Pe* situated on soft interscutal membrane in the posterior part of body. Setae *Ci* very long and thicker than all ventral idiosomal setae and situated on small bases; setae *Si* shorter than setae *Se*. Coxal plates I–III with reticulations. Urstigma occupying lateral position on border between coxae I and II and provided with cups.

Excretory pore plate wider than long (Figs 271–275). Both pairs of anal setae situated near anterior margin of excretory pore plate, setae *Ae* longer than *Ai*. Excretory pore open in posterior half of excretory pore plate.

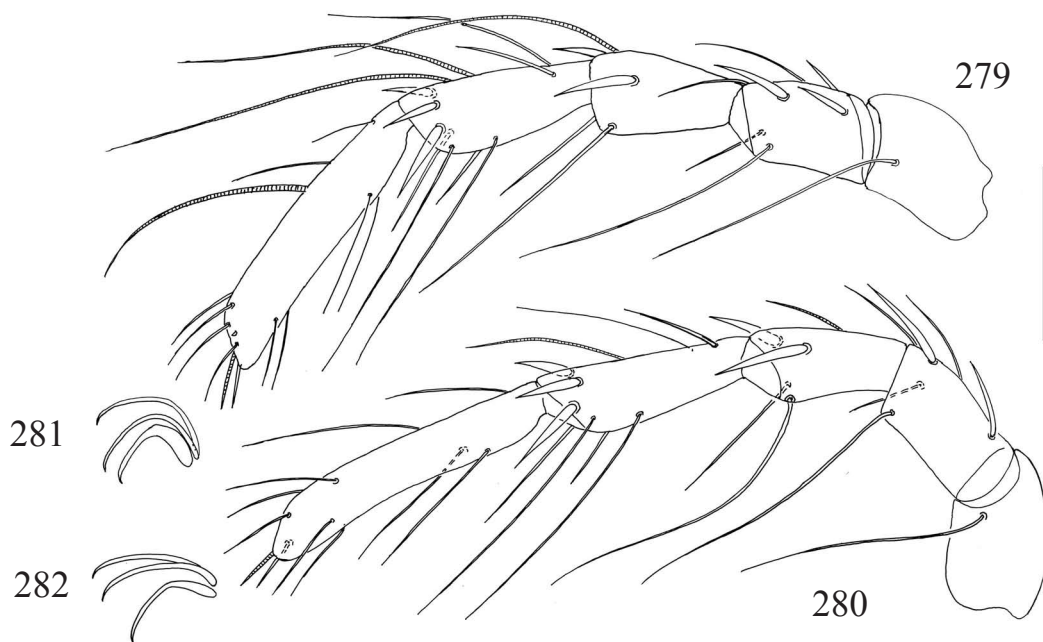
Capitulum (Fig. 276) elongate, base of capitulum longer than wide; rostrum with long and thin anterior hypostomal setae and short spine-like posterior ones. Basal segments of chelicerae (Fig. 277) fused at their medial parts and tapering proximally; suture line well developed along their whole length. Cheliceral stylet small and crescent in shape.

Pedipalp trochanter (Fig. 277) short and without setae; dorsodistal setae of femur and genu of pedipalps thin, short and approximately equal in size, proximal lateral genual seta very long and thick; tibia with 3 short subequal setae and large dorsodistal claw. Pedipalpal tarsus with 1 solenidion, 2 long setae and 5 unequal short setae.

All legs relatively long (Figs 270, 279–280). General number of setae on legs I–III (Figs 258–260), except eupathidia, is as follows: I–Leg. 1–5: 1, 7, 5 (s), 10 (2s), 13 (s, ac); II–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5: 1, 6, 5 (s), 10 (s), 11 (ac). Formula of large setae on leg segments as follows: I–Leg 1–5: 0, 3, 1, 1, 0; II–Leg 1–5: 0, 3, 2, 3, 0; III–Leg 1–6: 0, 2, 2, 3, 0. Proximal solenidion on tibia I shorter than distal one, solenidion on genu I and distal solenidion on tibia I approximately subequal in length; solenidion on genu II and distal solenidion on tibia II approximately subequal in length, proximal solenidion on tibia II slightly shorter than distal one; solenidion on genu III nearly twice as short as solenidion on



Figs 271–278. *Tiphys torris*, larva: 271–275 — excretory pore plate, 276 — capitulum (ventral view), 277 — chelicerae, 278 — pedipalp. Scale bars: 272–275 = 30, 276–278 = 25.



Figs 279–282. *Tiphys torris*, larva: 279 — leg II, 280 — leg III, 281 — claws of leg I, 282 — claws of leg III. Scale bar: 279–282 = 25.

tibia III. Central claw and lateral claws on tarsi of all legs approximately subequal in size (Fig. 281–282); empodium on tarsi of legs I and II bent almost at right angle, on tarsus III empodium only slightly bent.

Measurements (n=10). Length of dorsal shield 200–227, width 115–128; length of the anal plate 13–20, width 25–27; length of capitulum 60–65; length of basal segment of chelicera 57–60, length of cheliceral stylet 13–16; length of medial margin of coxae I 60–67, length of medial margin of coxae II+III 90–96; length of pedipalpal segments (P-1–5): 4–7, 22–26, 16–19, 6–7; length of the legs segments: I–Leg. 1–5: 25–29, 25–27, 28–30, 35–38, 47–50; II–Leg. 1–5: 28–32, 28–30, 28–32, 40–43, 57–64; III–Leg. 1–5: 28–32, 32–35, 41–45, 57–67.

Remarks. Tibia of leg I in larva *T. torris* with 10 setae; in contrast, tibia I at larvae in majority of species of the genus *Tiphys* with 11 setae.

Ecology. Temporary ponds, sedge bogs, lakes, brooks. Also in permanent waters.

Geographical distribution. Europe, Asia, North America: Alaska (Sokolow 1940; Viets 1956; Cook 1956; Lundblad 1968; K.O. Viets 1978).

Tiphys (Tiphys) bullatus (Thor, 1899)

I was not able to examine any specimens of *T. bullatus*. The diagnosis of this species is based on reference data (Thor 1899; K. Viets 1936; Sokolow 1940).

Diagnosis. Male. External lateral seta on pedipalpal genu situated in middle of segment; ventral tubercles on pedipalpal tibia poorly developed, distal spine on tibia less than 0.25 length of tarsus; genu IV without ventroproximal corner, tibia IV with distal protrusion.

Female. Idiosoma very similar to that in female of *T. torris*.

Remarks. This species is similar to *T. torris*. The adults mites of *T. bullatus* differ from *T. torris* by the following characters (characters states of *T. bullatus* indicated in parentheses are from Thor 1899; K. Viets 1936; Sokolow 1940): in both sexes, the base of external lateral seta on the pedipalpal genu situated distally to the middle of segment (in the middle of this segment), external seta on pedipalpal tibia situated on a large tubercle (small tubercle), distolateral spine of tibia 2.0–2.5 times shorter than tarsus (approximately 4 times shorter than tarsus); in male, genu IV is greatly expanded dorsoventrally, with distinct ventroproximal cor-

ner (slightly expanded dorsoventrally and without ventroproximal corner).

Ecology. Temporary ponds, sedge bogs, lakes, brooks.

Geographical distribution. Europe (Viets 1936, 1956; Sokolow 1940; K.O. Viets 1978).

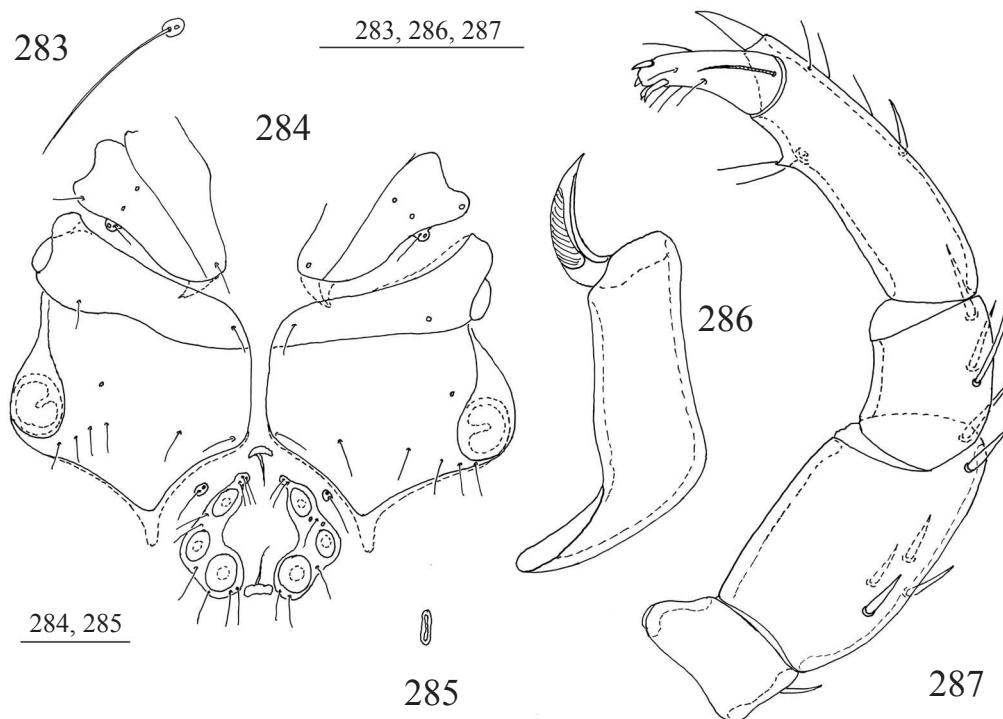
Tiphys (Tiphys) samaraensis sp. n.

Figs 283–290

Material. Holotype female (IBIW 7796): Europe, Russia, Samara Province, National natural Park “Samara Luka”, village Koltsovo, sedge bog, 29 June 1981, P.V. Tuzovskiy.

Diagnosis. Female. Suture line between coxal plates III and IV nearly transverse. Medial margin of coxal plate IV approximately 3 times longer than medial margin of coxae III. Posteromedial margin and posterolateral margin of coxae IV forming large right angle with distinct apodeme beneath this angle. Sclerites bearing setae *Hv* fused with posterior margins of coxal plates II. Genital plates elongate, roughly crescent, with 3 acetabula and 8–9 thin short setae each, third acetabulum larger than two other acetabula. Genital opening slightly longer than genital plates. Anterior genital sclerite lesser than posterior one. Excretory pore non-sclerotized. Pedipalps slender, genu with 3 setae, external lateral seta longer than two other setae, base of external seta situated in middle of segment. Pedipalpal tibia long, slender with rather large distolateral spine (2.5 times shorter than tarsus), both ventral setae situated on very small tubercles near distal end of segment. Claws of legs I–IV subequal in sizes.

Differential diagnosis. The female of the new species is similar to the female of *T. ornatus*, from which it differs by the following characters (character states of the female of *T. ornatus* are given in parentheses): coxal plate IV has right posteromedial angle, Fig. 284 (with acute angle, Fig. 20), external setae of pedipalpal genu are situated in the middle of segment, Fig. 287 (near distal end, Fig. 27), both ventral seta are inserted near distal end of pedipalpal tibia (near middle of the segment), claws of legs I–IV are subequal in sizes (claws of legs I–III considerably larger than claws of legs IV). Claw of legs I–IV are subequal in size too in the female of *T. ensifer*, but in this species the medial margins of coxal plates III and IV are nearly equal in length (Fig. 344), pedipalpal tibia is without ventral tubercles (Fig. 348), genital plates are wide and with 13–17 setae each. In contrast, in the female *T. samaraensis* sp. n., the medial margin of coxal plate



Figs 283–287. *Tiphys samaraensis*, female: 283 — seta Fch, 284 — ventral view, 285 — excretory pore, 286 — chelicera, 287 — pedipalp. Scale bars = 100.

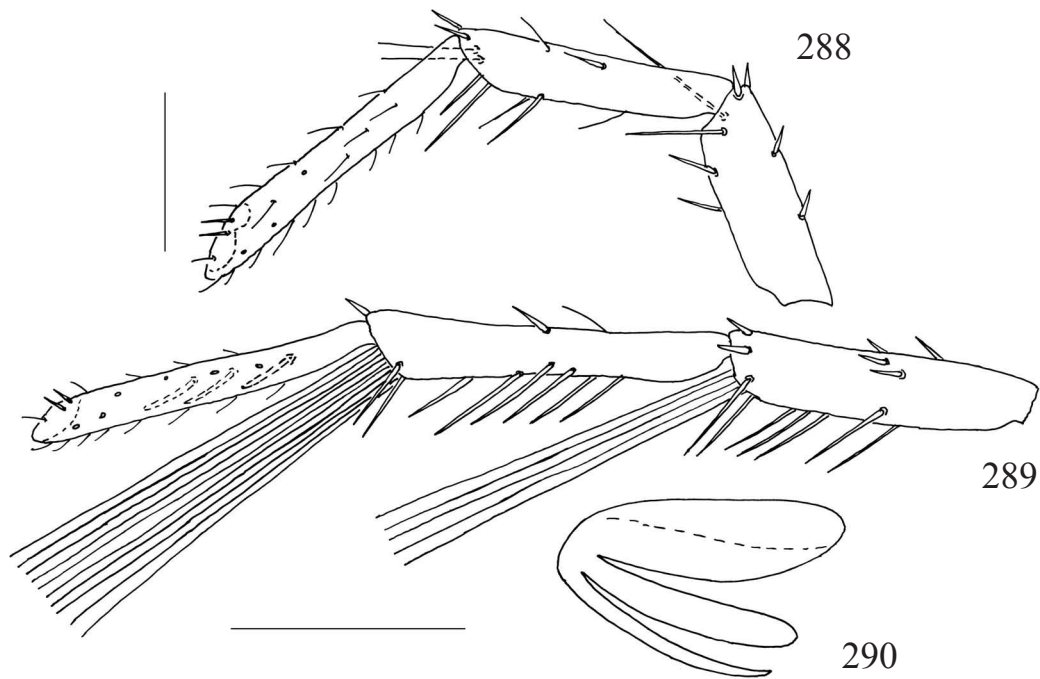
IV is 3 times longer than the medial margin of coxal plate III, pedipalpal tibia bears ventral tubercles, and genital plates are narrow with 8–9 setae each.

Description. Female. Body oval; setae *Fch* long, thin (Fig. 283), other idiosomal setae hair-like. Integument soft with very fine strips. Dorsal plates not found. Coxal plate I with 1 posteromedial thin seta, coxal plate II with 3 lateral thin setae, coxal plate III with 1 medial seta and 1 lateral one, coxal plate IV with 2 medial setae and 5 lateral ones (Fig. 284). Apodeme beneath posteromedial medial edge of coxal plate I moderately developed. Suture line between coxal plates III and IV nearly transverse, medial margin of coxal plate IV 3 times as long as medial margin of coxae III. Posteromedial margin and posterolateral margin of coxae IV forming right angle with distinct apodeme beneath this angle. Sclerites bearing setae *Hv* fused with posterior margins of coxal plates II; other idiosomal setae situated on soft cuticle freely. Genital plates elongate, roughly crescent, with 3 acetabula and 8–9 thin short setae each. Third acetabulum larger than two other acetabula; distance between first and second acetabula, and distance between second and third acetabula lesser than diameter one acetabulum. Genital opening slightly longer than genital plates. Anterior genital sclerite small, and not larger than posterior one. Excretory pore unsclerotized (Fig. 285).

Capitulum with short anchoral projection, both pairs of setae equal in length. Chelicera with large basal segment and relatively small pointed stylet (Fig. 286).

Pedipalps slender (Fig. 287). Pedipalpal trochanter with single short dorsodistal seta, femur with 4 proximal and 2 dorsodistal setae. Ventral margin of femur straight or slightly convex, ventral margin of genu concave. Pedipalpal genu with 3 setae, external lateral seta longer than two other setae; base of external seta situated near middle of segment. Pedipalpal tibia long, slender with rather large distolateral spine (2.5 times shorter than tarsus), 2 ventral and several thin dorsal setae and single thick dorsal spine near middle of segment; both ventral setae inserted on very small tubercles near distal end of segment. Pedipalpal tarsus with single long proximal solenidion, 5 thin setae and 4 thick distal unequal spines.

All legs long, thin (Figs 288–289). Legs II–IV with swimming setae; second pair of legs with short swimming setae, two posterior pairs of legs with long swimming ones. One swimming seta or two swimming setae present on genu of legs II, 2–3 on genu II, 3–5 on tibia II and III, 5 on genu IV, 9–10 on tibia IV. Claws of legs I–III and claw of legs IV subequal in sizes. Internal denticle of claw of legs I–IV rather wide with rounded tip, external denticle thin and pointed (Fig. 290).



Figs 288–290. *Tiphys samaraensis*, female: 288 — genu, tibia and tarsus of leg I, 289 — genu, tibia and tarsus of leg IV, 290 — claw. Scale bars: 288–289 = 100, 290 = 50.

Measurements (n=1). Body length 810, length of medial margin of coxa III 42–48, length of medial margin of coxa IV 120–125; length of genital plates 145–150, width 55; length/width of genital acetabula (*ac.* 1–3): 47–49/27–30, 36–42/24–30, 48–50/41–43; width of anterior genital sclerite 30; length of basal segment of chelicera 160; length of cheliceral stylet 65; length of pedipalpal segment (P-1–5): 50, 132, 72, 155, 65; length of distolateral spine of tibia 27; length of leg segments: I-Leg. 1–6: 120, 155, 170, 260, 310, 365; II-Leg. 1–6: 130, 170, 230, 285, 335, 390; III-Leg. 1–6: 125, 165, 215, 270, 340, ?; IV-Leg. 1–6: 185, 220, 250, 335, 400, 385.

Male. Unknown.

Deutonymph. Unknown.

Larva. Unknown.

Ecology. Sedgy bog.

Geographical distribution. Europe, Russia: Yaroslavl Province.

***Tiphys (Tiphys) yaroslavlensis* sp. n.**

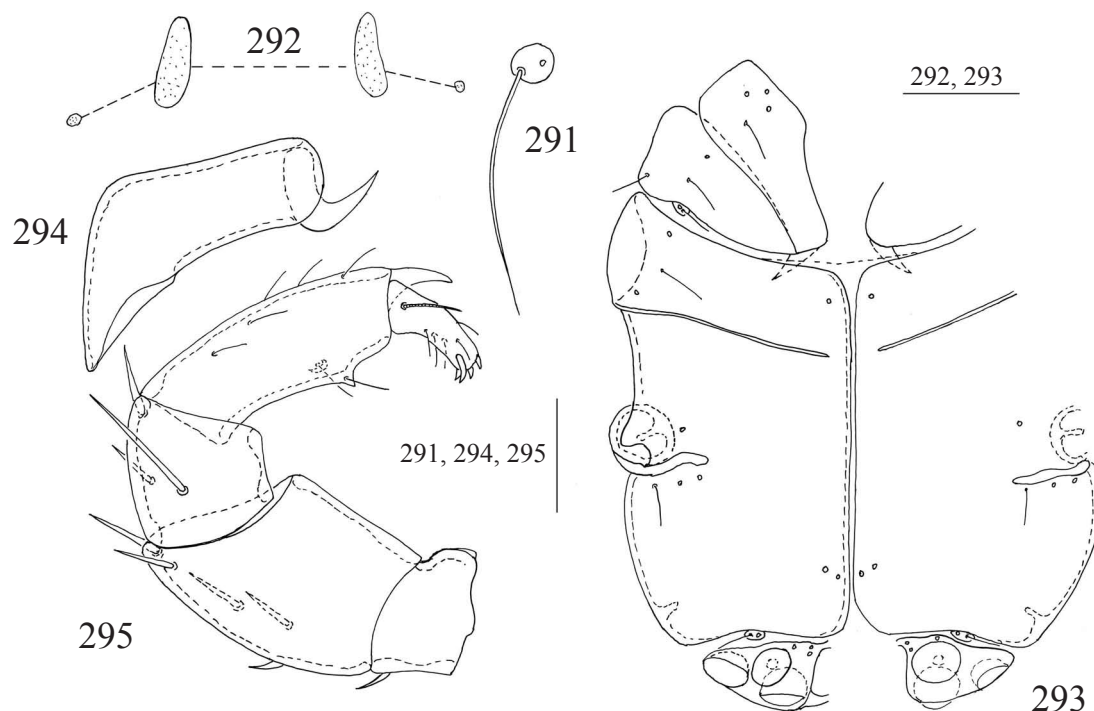
Figs 291–299

Material. Holotype male (IBIW 9366): Russia, Yaroslavl Province, Nekouz Distr., village Pogorelka, sedge-sphagnum bog, 18 May 2006, P.V. Tuzovsky.

Diagnosis. Male. Medial margin of coxal plate IV 3.3 times longer than medial margin of

coxal plate III. Posterior margins of coxal plates IV slightly concave. Genital plates triangular and fused with anterior genital sclerite; all acetabula relatively large, approximately subequal in sizes. Sclerites bearing setae *Hv* fused with posterior margins of coxal plates II; sclerites bearing setae *Pe* fused with posterior margins of coxal plates IV. Pedipalpal genu with 3 setae, external lateral seta considerably longer than two other setae; base of external lateral seta situated proximally to middle of segment; tibia with short distolateral spine (3 times as short as tarsus), both ventral setae situated on small tubercles distally to middle of segment. Genu IV slightly expanded distally, with slightly convex dorsal margin and concave ventral one, bearing 6 relatively short thick setae and rather numerous long distal ones; tibia IV slightly curved, with concave dorsal and convex ventral sides, with single short fan-like seta, 6 short sword-like ventrolateral setae, and 7 long distal swimming setae. Claws of legs III asymmetric, large claw with 2 thick curved denticles, external denticle with short and fine spur; small claw with 2 unequal straight pointed denticles.

Differential diagnosis. The male of the new species is similar to the male of *T. torris*, from which differs by the following characters (character states of the female of *T. torris* are given in parentheses): base of external lateral seta on pedi-



Figs 291–295. *Tiphys yaroslavlensis* sp. n., male: 291 — seta Fch, 292 — anteromedial and anterolateral dorsal plates, 293 — ventral view, 294 — chelicera, 295 — pedipalp. Scale bars: 291, 294–295 = 50, 292–293 = 100.

palpal genu situated proximally to the middle of segment, Fig. 295 (distally to the middle of segment, Fig. 256); genu IV slightly expanded distally, without ventroproximal corner, the height of anterior end of this segment is lesser than the height of distal end of telofemur, Fig. 297 (genu of leg IV is greatly expanded dorsoventrally with well developed ventroproximal corner, the height of anterior end of genu is larger than the height of distal end of telofemur, Fig. 261); claws of legs III are asymmetrical, the large claw has 2 thick curved denticles, the external denticle with short and fine spur; the small claw has 2 unequal straight pointed denticles, Fig. 299 (both claws of legs III are subequal with three unequal denticles each, Fig. 262).

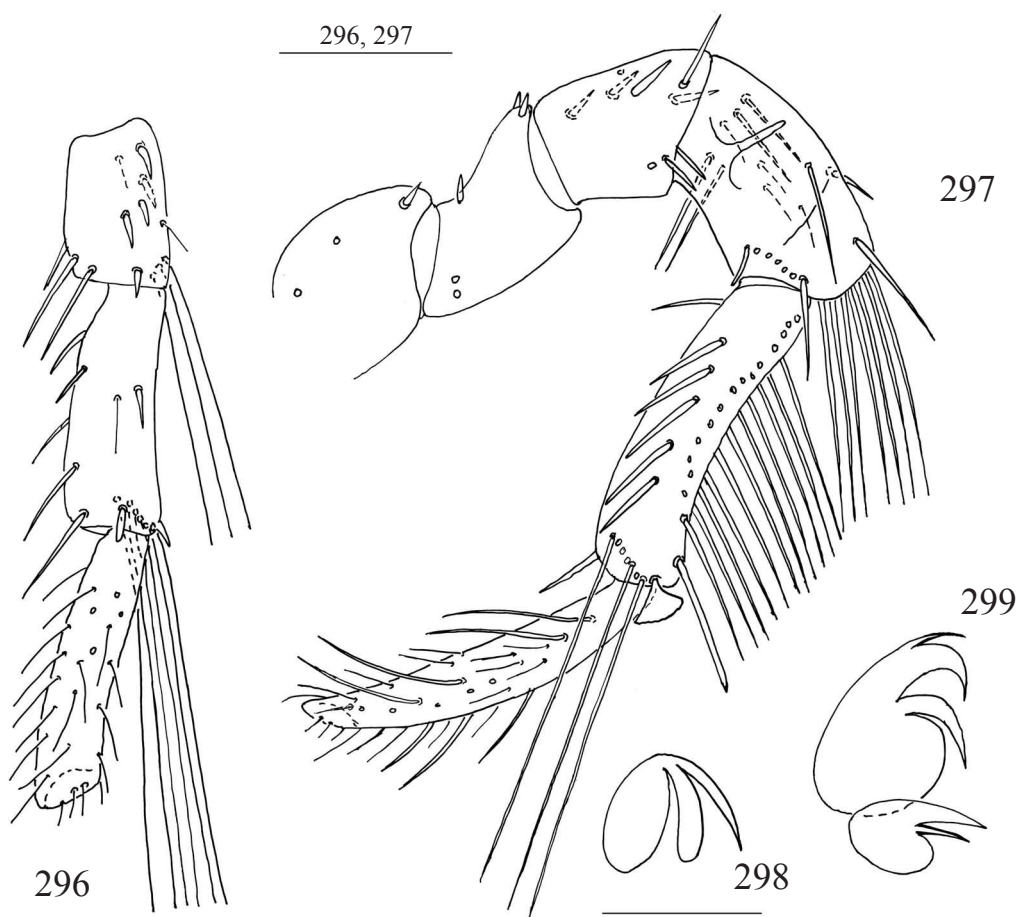
Description. Male. Body oval; setae *Fch* long, whip-like (Fig. 291), other idiosomal setae filiform. Integument soft striated. Dorsum with relatively large anteromedial and small anterolateral platelets (Fig. 292), posteromedial platelets not developed; anteromedial plates elongate, anterolateral platelets oval. Anterior apodemes extending beyond medial edge of coxal plate III (Fig. 293). Coxal plates IV greatly expanded, fused with one another along whole medial edges. Coxal plate I with 4 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 3 lateral thin setae, coxal plate III with 3 lateral setae and 1 medial seta, coxal plate IV with 2 posteromedial and 4

short lateral setae. Medial margin of coxal plate IV 3.3 times longer than medial margin of coxal plate III. Posterior margins of coxal plates IV slightly concave.

Genital plates triangular and fused with anterior genital sclerite; all acetabula relatively larger, approximately subequal in sizes, and occupy more than one half of surface of plates. Sclerites bearing setae *Hv* fused with posterior margins of coxal plates II; sclerites bearing setae *Pe* fused with posterior margins of coxal plates IV, other ventral idiosomal setae situated on soft cuticle freely.

Capitulum with short anchoral projection, both pairs of setae equal in length. Chelicera with large basal segment and relatively small stylet (Fig. 294).

Pedipalps (Fig. 295) stout. Pedipalpal trochanter with single short dorsodistal seta, femur with 3 proximal and 2 dorsodistal unequal setae. Ventral margin of femur straight, ventral margin of genu slightly concave. Pedipalpal genu with 3 setae, external lateral seta considerably longer than two other setae; base of external lateral seta attached proximally to middle of segment. Pedipalpal tibia with relatively short distolateral spine (3 times shorter than tarsus), 2 ventral and several dorsal setae; both ventral setae located on small tubercles distally to middle of segment. Pedipalpal tarsus with single long proximal solenidion, with 5 thin setae and 4 thick distal unequal spines.



Figs 296–299. *Tiphys yaroslavlensis* sp. n., male: 296 — genu, tibia and tarsus of leg III, 297 — leg IV, 298 — claws of leg II, 299 — claws of leg III. Scale bars: 296–297 = 100, 298 = 50, 299 = 25.

Genu III (Fig. 296) short, tarsus III longer than tibia III; genu III with 3, and tibia III with 6 long swimming setae. Genu of leg IV (Fig. 297) nearly not expanded dorsoventrally relatively to femur IV, with slightly convex dorsal margin and straight ventral margin, bearing a few relatively short thick dorsolateral setae and 7 rather long distal ones. Tibia IV slightly curved with concave dorsal and convex ventral sides, with a few long dorsal setae, single short fan-like seta, 6 short sword-like ventrolateral setae, and 7 long distal swimming setae. Tibia and tarsus IV subequal in length, last slender, slightly tapering distally with numerous short and fine setae and 7 relatively long thick unequal setae.

Claws of legs I–II are larger, than claws of legs IV. Internal denticle of claw of legs I–II rather wide with rounded tip, external denticle thin and pointed (Fig. 298). Claws of legs III asymmetric (Fig. 299); large claw with 2 thick curved denticles, external denticle with short and fine spur; small claw with 2 straight pointed denticles, external denticle longer and thicker than internal denticle.

Measurements, $n=1$. Body length 580, length of medial margin of coxa III 78, length of medial margin of coxa IV 260; length of anteromedial dorsal plates 55, their width 20; length of genital plates 96, their general width 240; length/width of genital acetabula (*ac.* 1–3): 36–42/42–48, 42/48, 42/48; length of basal segment of the chelicera 125, length of the cheliceral stylet 51; length of pedipalpal segment (P-1–5): 42, 110, 60, 120, 50; length of distolateral spine on tibia 21; length of leg segments: I–Leg. 1–6: 72, 95, 120, 155, 170, 240; II–Leg. 1–6: 72, 95, 120, 160, 185, 250; III–Leg. 1–6: 72, 90, 90, 115, 168, 198; IV–Leg. 1–6: 138, 120, 120, 170, 235, 235.

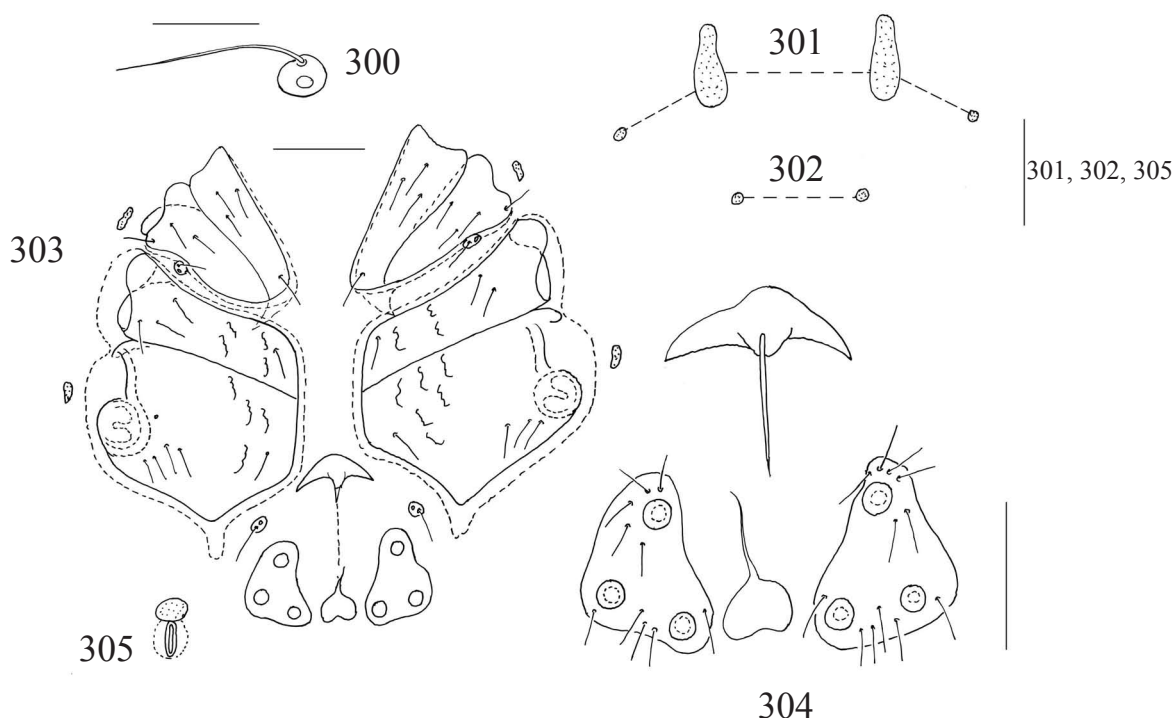
Ecology. Sedgy bog.

Geographical distribution. Europe, Russia: Yaroslavl Province.

Tiphys (Tiphys?) minutiporus sp. n.

Figs 300–323

Material. Holotype female (IBIW 4475): Asia, Russia, Magadan Province, Tenka Distr., village Agrobasa: sedge-sphagnum bog on the left bank of the Kolyma river, 1 km upstream of the



Figs 300–305. *Tiphys minutiporus*, female: 300 — seta Fch, 301 — anteromedial and anterolateral dorsal plates, 302 — posteromedial plates, 303 — ventral view, 304 — genital field, 305 — excretory pore. Scale bars: 300 = 50, 301–305 = 100.

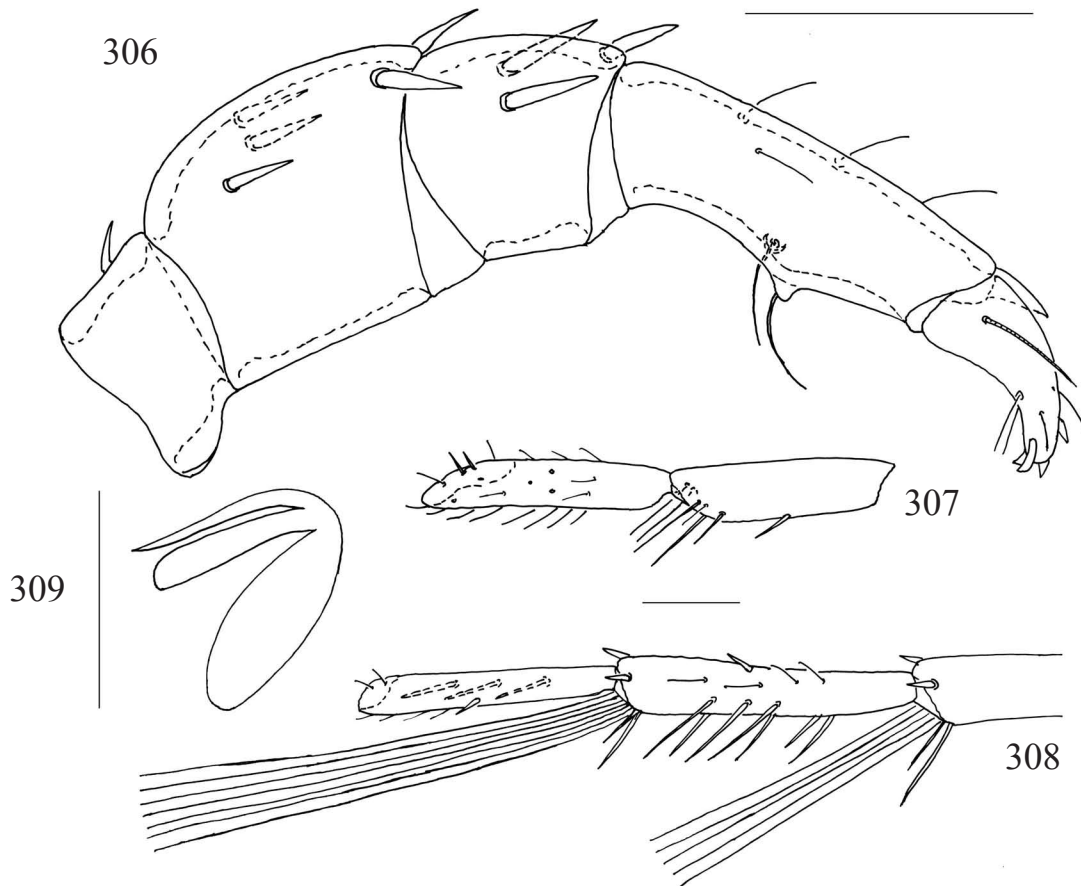
settlement, 18 July 1983, P.V. Tuzovsky. Paratypes: 4 larvae reared in laboratory.

Diagnosis. Female. Medial margin of coxal plate IV slightly longer than medial margin of coxal plate III. Posteromedial and posterolateral margins of coxae IV forming right or blunt angle with very short apodeme beneath this angle. Sclerites bearing setae *Hv* fused with posteromedial margin of coxa II. Genital plates triangular with 3 acetabula and 10–12 short and fine setae each. All acetabula very small and approximately subequal in size, arranged in triangular; distance between first and third acetabula equal nearly 3 diameters of one acetabulum, distance between second and third acetabula equal 2 diameters of one acetabulum. Pedipalpal genu with 3 short approximately subequal in length setae, external lateral seta twice as short as dorsal margin of segment; base of external lateral seta situated in middle of segment. Tibia slender with short distolateral spine (3 times as short as tarsus), both ventral setae situated near middle of pedipalpal on small tubercles.

Larva. Dorsal shield elongate (ratio length/width 1.55–1.60), covering almost all dorsum in unengorged larva. Setae *Fch* and *Vi* slightly longer and thicker than *Fp* and *Oi*. All coxal setae (C1–C4) approximately subequal in length. Base of setae C4 on coxal plate III situated closely to medial end of suture line between coxal plates II and III. Transverse

muscle attachment scar and posteromedial margins of coxal plates III slightly separated. Dorsal shield and coxal plates I–III porous. Excretory pore plate wider than long, ratio length/width = 0.81–0.85; both pairs of anal setae subequal in length. Excretory pore situated distally to middle of excretory pore plate. Solenidion on genu of leg I and solenidia on tibia I approximately subequal in length; solenidion on genu II shorter than distal solenidion on tibia II, bases of solenidia on tibia II separated, distal solenidion longer than proximal one.

Differential diagnosis. The new species is similar to *T. scaurellus*. The female and larva of *T. minutiporus* sp. n. differ from the female and larva of *T. scaurellus* by the following characters (character states of the female and larva of *T. scaurellus* are given in parentheses): female — the genital plates are broad, length/width ratio 1.4, Figs 303–304 (elongate, length/width ratio 1.7–2.0, Figs 102–107), the genital acetabula are minute, ac. 1–3: 16–18, 17–19, 21–23 (relatively large, ac. 1–3: 24–27, 24–25, 25–30), pedipalpal genu with 3 short subequal setae, Fig. 306 (with 2 unequal setae, Fig. 109); larva — the dorsal plate is elongate, length/width ratio 1.5–1.6, Fig. 310 (broad, length/width ratio, 1.15–1.20, Fig. 124), the tmas present, Fig. 311 (absent, Fig. 125), the bases of setae C4 are placed near the suture line between the coxal plates II and III (well separated), the excre-



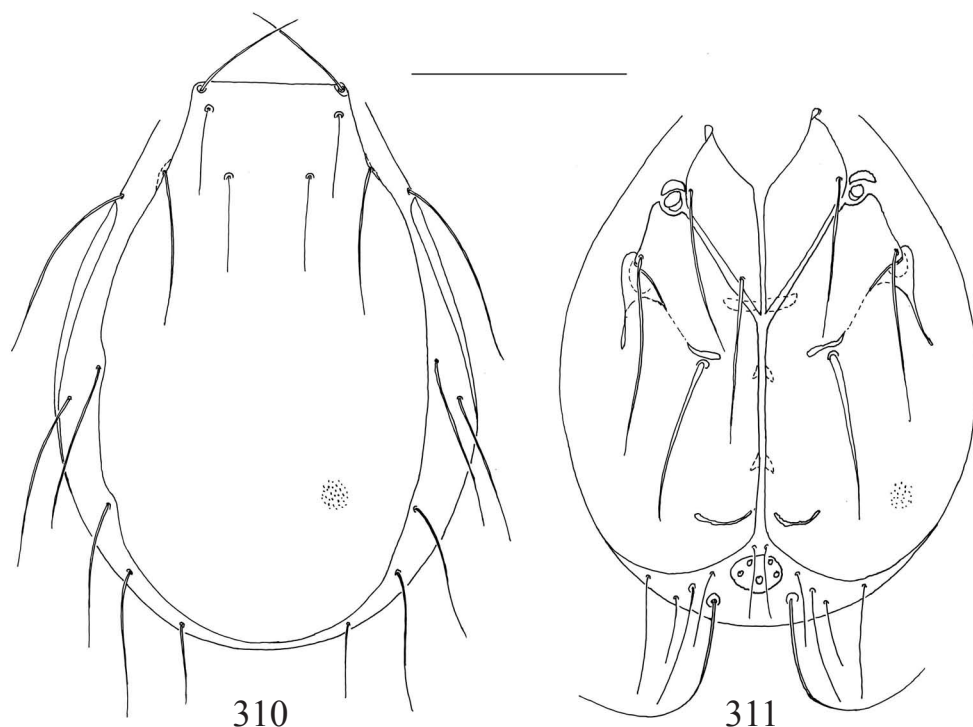
Figs 306–309. *Tiphys minutiporus*, female: 306 — pedipalp, 307 — tibia and tarsus of leg II, 308 — genu, tibia and tarsus of leg IV, 309 — claw. Scale bars: 306–308 = 100, 309 = 50.

tory pore open in posterior half of the excretory pore plate, Figs 312–315 (in anterior half of the excretory pore plate, Figs 126–127).

Description. Female. Body oval; setae *Fch* long, whip-like (Fig. 300), other idiosomal setae filiform. Integument soft with very fine strips. Dorsum with relatively large anteromedial plates, small anterolateral and posteromedial platelets slightly developed (Figs 301–302). Coxal plate I with 3 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 3 lateral thin setae, coxal plate III with 1 medial seta and 2–3 lateral setae, coxal plate IV with 1 medial seta and 3–4 lateral ones (Fig. 303). Apodeme beneath posteromedial medial edge of coxal plate I moderately developed and slightly extending beyond medial edge of coxal plate III. Suture line between coxal plates III and IV complete oblique, directed posteromedially. Medial margin of coxal plate IV slightly longer than medial margin of coxal plate III. Posteromedial and posterolateral margins of coxae IV forming right or obtuse angle with very short apodeme beneath this angle. Sclerites, bearing setae *Hv*, fused with posteromedial margin of coxa II, other idiosomal setae situated on soft cuticle freely.

Genital plates triangular, with 3 acetabula and 10–12 short and fine setae each (Fig. 304). All acetabula very small and subequal in size, arranged in triangular; acetabula occupy considerably lesser than one half of surface of genital plate; distance between first and third acetabula equal to nearly 3 diameters of one acetabulum, distance between second and third acetabula equal to 2 diameters of one acetabulum. Genital opening longer than genital plates, anterior genital sclerites considerably wider than posterior one. Excretory pore with anterior sclerite (Fig. 305).

Capitulum with anchoral processes, both pairs of setae equal in length. Basal segment of chelicera with large dorsal hump. Cheliceral stylet relatively large, pointed. Pedipalpal trochanter with single short dorsodistal seta, femur with 3 proximal and 2 dorsodistal short setae, ventral margin of femur and genu straight (Fig. 306). Pedipalpal genu with 3 approximately subequal in length setae, both proximal setae twice as short as dorsal margin of segment; base of external lateral seta attached near middle of segment. Pedipalpal tibia slender with short distolateral peg-like spine (3 times as short as tarsus), 2 ventral setae and sev-



Figs 310–311. *Tiphys minutiporus*, larva: 310 — dorsal view, 311 — ventral view. Scale bar: 310–311 = 100.

eral short and fine dorsal ones. Both ventral setae situated on small tubercles near middle of segment. Pedipalpal tarsus tapering distally with single long proximal solenidion, with five thin setae and four short, thick unequal distal spines.

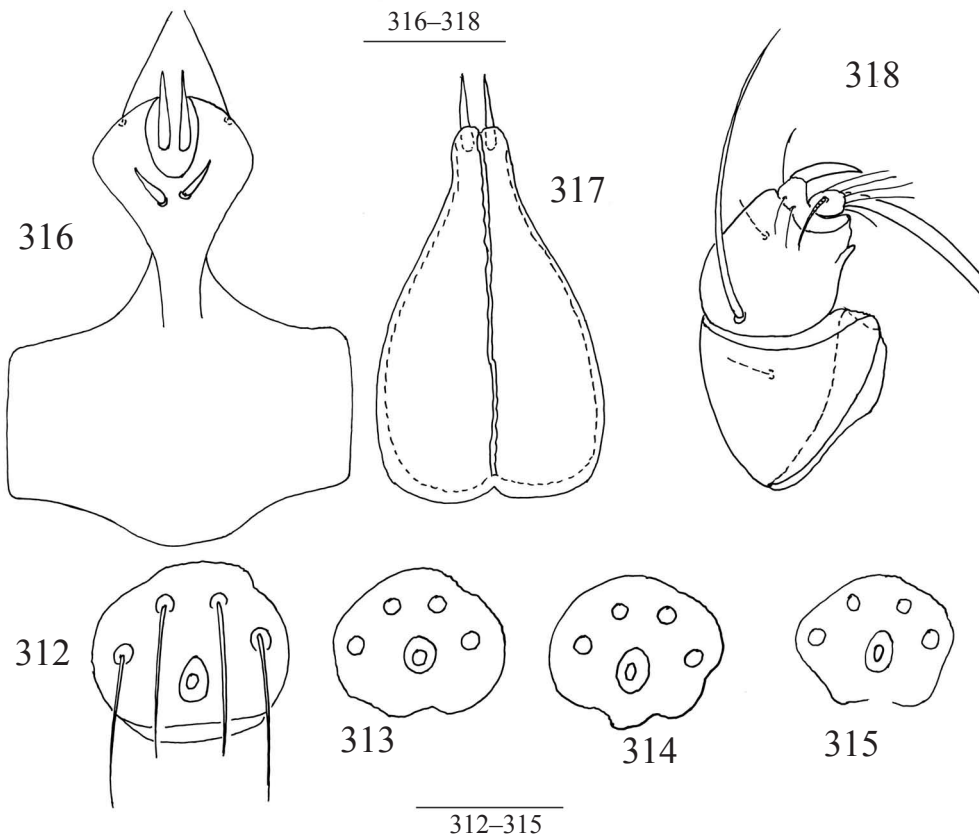
Legs I without swimming setae, tibia and tarsus cylindrical (Fig. 307). Legs II–IV with swimming setae; second pair of legs with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 308). Two swimming setae present on genu and tibia II, 3 on genu III and tibia II, 4–5 on tibia III, 5 on genu IV, 7 on tibia IV. Claws of legs I–III larger, than claws of legs IV; both denticles approximately equal in length, internal denticle wide with rounded tip, external denticle thin and pointed; claw lamella moderately developed, with slightly convex ventral margin (Fig. 309).

Measurements, μm . Body length 1005, length of medial margin of coxa III 60, length of medial margin of coxa IV 75; length of anteromedial dorsal plates 72, width 30, length of genital plates 120, width 85; diameter of genital acetabula (*ac*. 1–3): 16–18, 17–19, 21–23; width of anterior genital sclerite 102; length of basal segment of the chelicera 205, length of cheliceral stylet 63; length of pedipalpal segment (P-1–5): 42, 115, 72, 132, 57; length of distolateral spine of tibia 23; length of leg segments: I–Leg. 1–6: 78, 78, 125, 150, 175, 185; II–Leg. 1–6: 78, 85, 120, 155, 180, 200;

III–Leg. 1–6: 85, 90, 120, 150, 185, 185; IV–Leg. 1–6: 120, 105, 150, 205, 235, 210.

Larva. Body small and oval; dorsal shield truncate anteriorly, rounded posteriorly, with convex lateral edges, and weakly concave anterolaterally (Fig. 310). Dorsal shield elongate (ratio length/width 1.55–1.60), covering almost all dorsum in unengorged larva and bearing 4 pairs of setae: *Fch*, *Fp*, *Oi*, *Vi*. Setae *Fch* and *Vi* slightly longer and thicker than *Fp* and *Oi*. Setae *Oe*, *Hi*, *He*, *Sci*, *Sce* and *Li* located on the soft wrinkled membrane. Setae *Oe* and *He* nearly subequal in length and slightly longer than all dorsal setae, setae *Hi* longer than setae *He*, setae *Sce* longer *Li*. Lateral sides of coxae II+III coming onto dorsal side and almost extending to setae *Oi* and other hysterosomal setae located on interscutal membrane. Dorsal shield porous.

Coxal plates I–II relatively small; anterior coxal plates separated from coxal plates II and III which fused to each other, suture line between them incomplete and developed only in their lateral parts (Fig. 311). Anterior margin of coxal plates I slightly concave and considerably shorter than posterior one. All coxal setae (C1–C4) subequal in length, but C4 thicker than C1–C3. Base of setae C4 on coxal plate III attached closely to medial end of suture line between coxal plates II and III. Posteromedial apodemes of coxal plates I well developed, posteromedial apodemes of coxal



Figs 312–318. *Tiphys minutiporus*, larva: 312–315 — excretory pore plate, 316 — capitulum (ventral view), 317 — chelicerae, 318 — pedipalp. Scale bars: 312–315 = 25, 316–318 = 20.

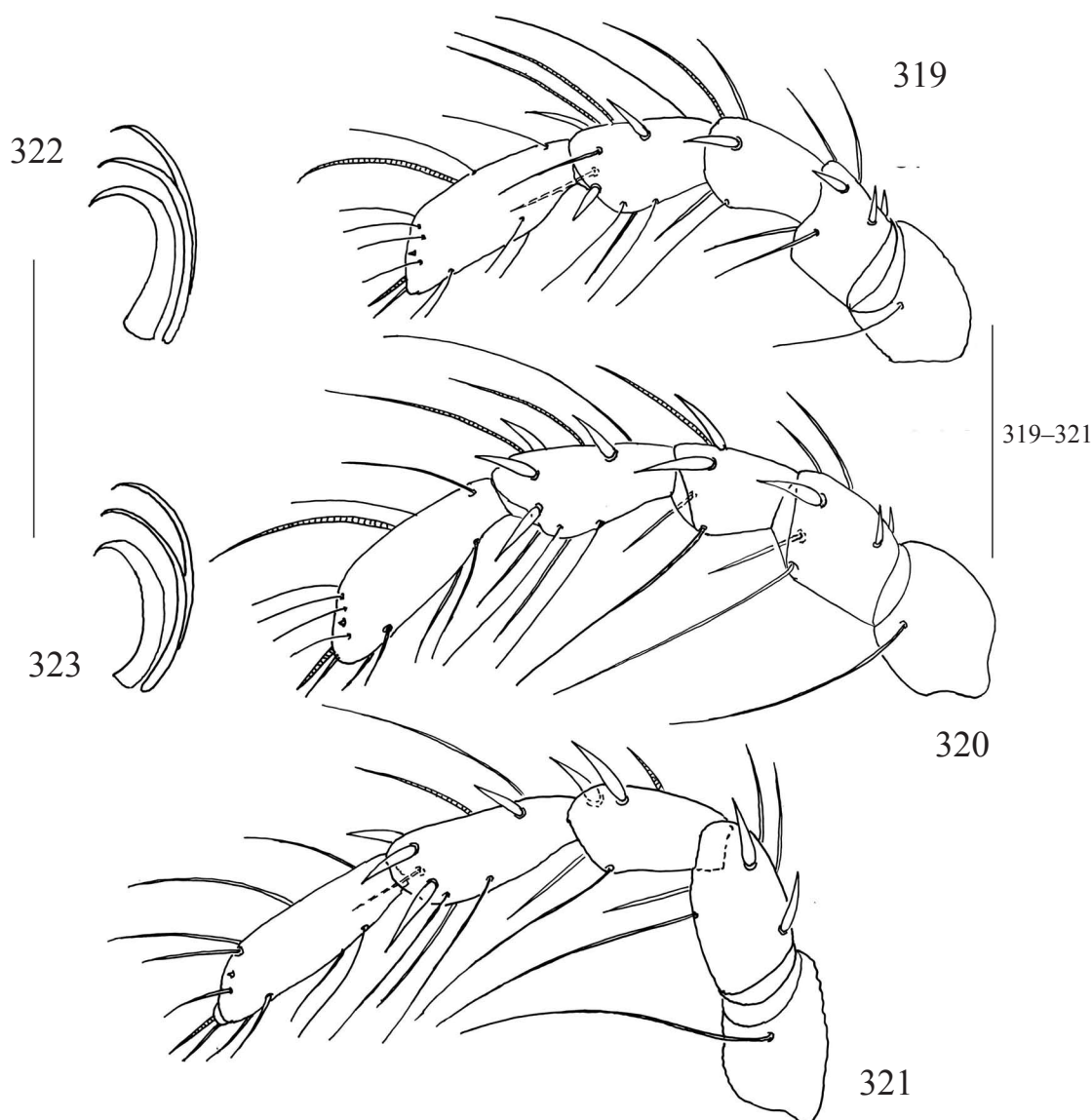
plates II and III small. Transverse muscle attachment scar and posteromedial margins of coxal plates III slightly separated. Setae *Ci*, *Si*, *Se*, *Le*, *Pi*, *Pe* situated on the soft interscutal membrane in the posterior part of the body. Setae *Ci* longer and thicker than all ventral idiosomal setae and situated on small bases; setae *Si* considerably shortest than setae *Se*. Coxal plates I–III porous. Urstigma occupying lateral position on the border between coxae I and II and provided with cups.

Excretory pore plate (Figs 312–315) wider than long, ratio length/width = 0.80–0.85. Both pairs of anal setae approximately equal in length. Setae *Ai* located near anterior margin of excretory pore plate, setae *Ae* located near middle of lateral margins of the plate. Excretory pore located distally to middle of excretory pore plate.

Capitulum (Fig. 316) with wide base, anterior hypostomal setae long, thin, posterior hypostomal setae short, spine-like. Basal segments of chelicerae (Fig. 317) fused with one another along whole medial edges and tapering proximally, lateral margins of these segments convex, posterior margin with small median incision. Cheliceral stylet small and crescent.

Pedipalpal trochanter (Fig. 317) short and without setae; distolateral seta of femur and genu of pedipalps thin, short and approximately equal in size, proximal lateral genual seta very long and heavy; tibia with 3 approximately subequal short, thin setae and large dorsodistal claw. Pedipalpal tarsus with one solenidion, 2 long and 5 unequal thin setae.

All legs short and stout. The general number of setae on legs I–III (Figs 319–321), except eupathidia, as follows: I–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); II–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5: 1, 6, 5(s), 10 (s), 11 (ac). Formula of large setae on leg segments as follows: I–Leg 1–5: 0, 3, 1, 2, 0; II–Leg 1–5: 0, 3, 2, 4, 0; III–Leg 1–6: 0, 2, 2, 4, 0. Solenidion on genu of leg I and solenidia on tibia I approximately equal in length; solenidion on genu II and proximal solenidion on tibia subequal and shorter than distal solenidion on tibia II, bases of solenidia on tibia II well separated; solenidion on genu of leg III twice shorter than solenidion on tibia III. Central claw on tarsi of all legs shorter than lateral claws; empodium on tarsi of legs I and II hook-like (Fig. 322), empodium on tarsus III only slightly bent (Fig. 323).



Figs 319–323. *Tiphys minutiporus*, larva: 319 — leg I, 320 — leg II, 321 — leg III, 322 — claws of leg I, 323 — claws of leg III. Scale bars: 319–321 = 50, 322–323 = 25.

Measurements, $n=4$. Length of dorsal shield 215–220, its width 135–140; length of anal plate 18–20, its width 22–24; length of capitulum 78–82; length of basal segment of chelicera 68–72, length of cheliceral stylet 15–16; length of medial margin of the coxae I 57–64, length of medial margin of the coxae II+III 83–95; length of pedipalpal segments (P-1–5): 6–8, 30–32, 22–24, 8–10, 6–8; length of legs segments: I–Leg. 1–5: 28–32, 20–26, 25–29, 30–34, 40–45; II–Leg. 1–5: 30–32, 28–32, 24–28, 36–40, 50–52; III–Leg. 1–5: 32–34, 28–30, 24–28, 36–40, 50–52.

Male. Unknown.

Deutonymph. Unknown.

Ecology. Sedge-sphagnum bog.

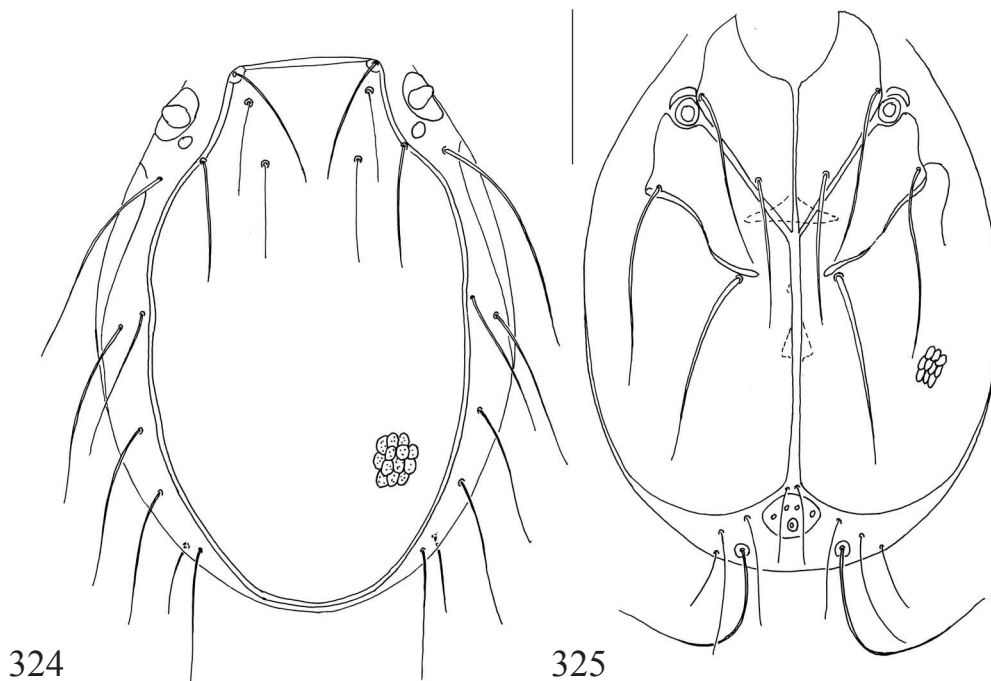
Geographical distribution. Asia, Russia: Magadan Province.

Tiphys (Tiphys?) chaunensis sp. n.

Figs 324–340

Material. Holotype larva (IBIW 4509): Asia, Russia, Magadan Province, Chaun Distr., thermocarstic lake near mountain Neytlin, 9 August 1982, P.V. Tuzovsky. Paratypes: 14 larvae reared in laboratory together with holotype, 1 female, 23 July 1982.

Diagnosis. Larva. Dorsal shield elongate (ratio length/width 1.5–1.6), surrounded by narrow subcutaneous strip, setae *Fch* and *Vi* situated on subcutaneous strip; setae C1 shorter than C4, setae C2–C4 approximately equal in length, but C4 thicker than C2 and C3, bases of setae C4 on coxal plate III attached closely to medial end of suture line between coxal plates II and III; transverse



Figs 324–325. *Tiphys chaunensis*, larva: 324 — dorsal view, 325 — ventral view. Scale bar: 324–325 = 100.

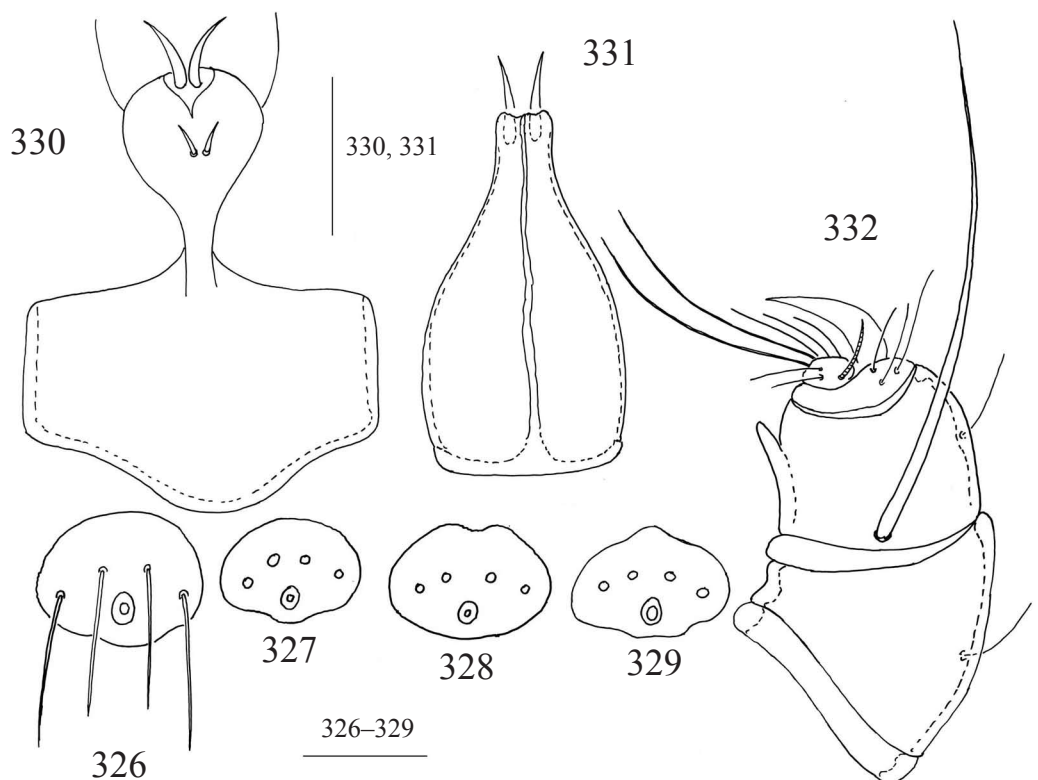
muscle attachment scar on coxal plate III not developed; excretory pore plate wider than long, both pairs of anal setae nearly subequal in length and situated near middle of excretory pore plate, excretory pore located near posterior margin of excretory pore plate; solenidion on genu I slightly longer than both solenidia on tibia I, which approximately subequal in length; solenidion on genu of leg II considerably shorter than both solenidia on tibia II; dorsal shield and coxal plates with reticulations.

Female. Suture line between coxal plates III and IV complete and slightly obliquely postero-medially directed. Medial margin of coxal plate III slightly shorter than medial margin of coxal plate IV. Posteromedial and posterolateral margins of coxae IV forming obtuse angle with short apodeme beneath this angle. Pedipalp femur and genu with nearly straight ventral margins; genu with 2 setae, base of external lateral seta located near middle of segment; tibia slender, with straight ventral margin, both ventral setae attached near distal end of segment, ventral tubercles not developed. Distolateral spine of tibia approximately 2.5 times shorter than tarsus.

Differential diagnosis. The coxal plates and pedipalpal tibia in females of the new species are similar to those in *T. ensifer*. The pedipalpal femur in females of *T. ensifer* with 6 dorsal setae, genu with 3 setae, and tibia with short dorsal spine (Fig. 348); in contrast, the pedipalpal femur of *T. chaun-*

ensis sp. n. with 5 dorsal setae, genu with 2 setae, and tibia without short dorsal spine (Fig. 340). The larva of *T. chaunensis* differs from the larva *T. ensifer* by the following characters (character states of the female of *T. ensifer* are given in parenthesis): the dorsal shield is surrounded by the narrow subcutaneous strip, setae *Fch* and *Vi* are situated on the subcutaneous strip, Fig. 324 (dorsal shield without narrow subcutaneous strip, setae *Fch* and *Vi* situated on the dorsal shield, Fig. 360); the dorsal shield and all coxal plates are covered with reticulations (porous pattern), the transverse muscle attachment scar on coxal plate III is absent, Fig. 325 (present, Fig. 361).

Description. Larva. Body small and oval; dorsal shield truncate anteriorly, rounded posteriorly, with slightly convex lateral edges and weakly concave anterolateral margins (Fig. 324). Dorsal shield elongate (ratio length/width 1.5–1.6), surrounded by narrow subcutaneous strip and covering almost all dorsum in unengorged larva, bearing only 2 pairs of trichobothria (*Fp*, *Oi*), setae *Fch* and *Vi* situated on subcutaneous strip. Setae *Fch* and *Vi* slightly longer and thicker than *Fp* and *Oi*. Setae *Oe*, *Hi*, *He*, *Sci*, *Sce* and *Li* located on the soft wrinkled membrane. Setae *Oe* longer of all dorsal setae, setae *Sce* and *Li* nearly equal in length. Lateral sides of coxae II+III coming onto dorsal side and almost extending to setae *Oe* and other hysterosomal setae located on interscutal membrane. Dorsal shield with reticulations.



Figs 326–332. *Tiphys chaunensis*, larva: 326–329 — excretory pore plate, 330 — capitulum (ventral view), 331 — chelicerae, 332 — pedipalp. Scale bars: 326–329 = 20, 330–331 = 50, 332 = 100.

Coxal plates I–II relatively small; anterior coxal plates separated from coxal plates II and III which fused to each other, suture line between them incomplete and developed only in their lateral parts (Fig. 325). Anterior margin of coxal plates I concave and considerably shorter than posterior one. Coxal setae C2–C4 approximately subequal in length and longer than C1, bases of setae C4 on coxal plate III inserted closely to beneath from medial end of suture line between coxal plates II and III. Posteromedial apodemes of coxal plates I relatively large, posteromedial apodemes of coxal plates II rudimentary or absent, and posteromedial apodemes of coxal plates III slightly developed. Transverse muscle attachment scar not developed. Setae *Ci*, *Si*, *Se*, *Le*, *Pi*, *Pe* situated on the soft interscutal membrane in posterior part of body. Setae *Ci* longer and thicker than all ventral idiosomal setae, and situated on small bases; setae *Li* considerably longer than setae *Le*, setae *Si* considerably shorter than setae *Se*. Coxal plates with reticulations. Urstigma occupying lateral position on the border between coxae I and II and provided cups.

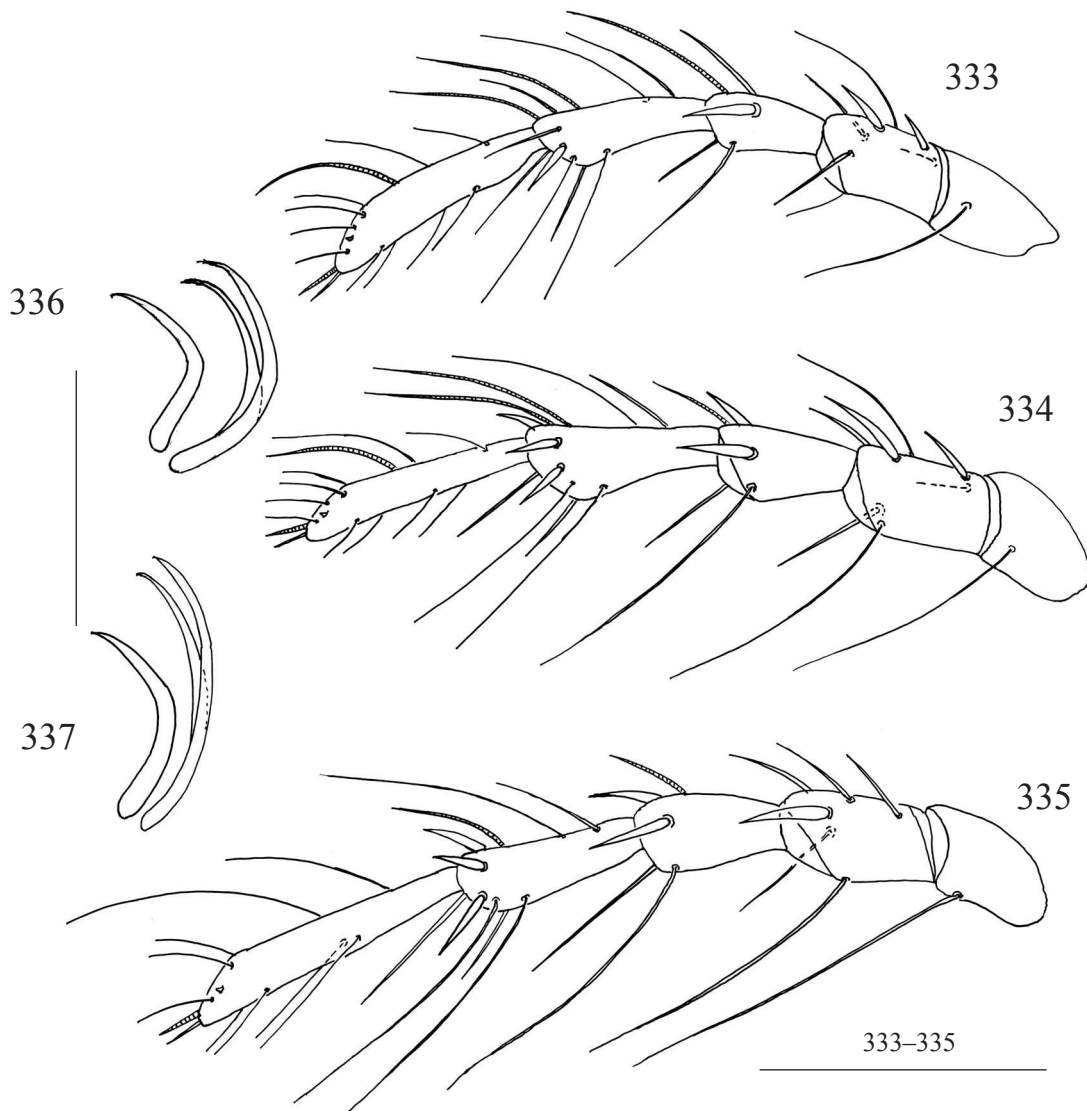
Excretory pore plate (Figs 326–329) wider than long, ratio length/width 0.6–0.7. Anal setae situated near middle of excretory pore plate, both pairs of anal setae (*Ai*, *Ae*) nearly equal in length.

Excretory pore open near posterior margin of excretory pore plate.

Capitulum (Fig. 330) with wide base, anterior hypostomal setae long and thin, posterior hypostomal setae short spine-like. Basal segments of chelicerae (Fig. 331) fused at their medial parts and tapering proximally, with straight posterior edges; suture line well developed along their whole length. Cheliceral stylet small, crescent.

Pedipalp trochanter (Fig. 332) short and without setae; femur with short and fine dorsal seta near middle of segment; genu with very long and thick proximal seta and short and fine dorsal one; dorsal setae on femur and genu approximately equal in length; tibia with 3 unequal thin setae and large dorsodistal claw. Tarsus with 1 solenidion, 2 long and 5 unequal short setae.

All legs (Figs. 333–335) rather slender. General number of setae on legs I–III, except eupathidia, as follows: I–Leg. 1–5: 1, 7, 5 (s), 11(2s), 13 (s, ac); II–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5: 1, 6, 5(s), 10 (s), 11(ac). Formula of large setae on leg segments as follows: I–Leg 1–5: 0, 2, 1, 1, 0; II–Leg 1–5: 0, 3, 2, 3, 0; III–Leg 1–6: 0, 1, 2, 3, 0. Solenidion on genu of leg I slightly longer than both solenidia on tibia I, which approximately equal in length; solenidion on genu of leg II considerably shorter than both solenidia on



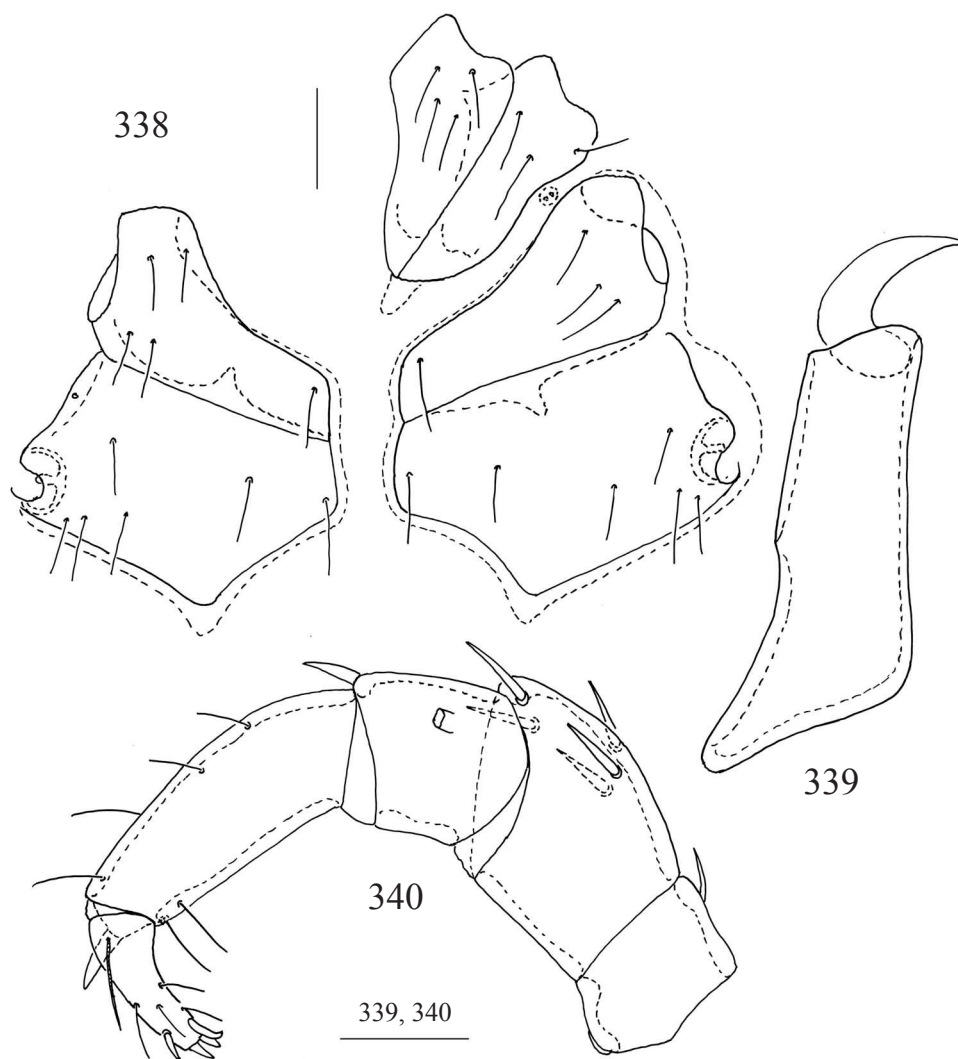
Figs 333–337. *Tiphys chaunensis*, larva: 333 — leg I, 334 — leg II, 335 — leg III, 336 — claws of leg I, 337 — claws of leg III. Scale bars: 333–335 = 100, 336–338 = 25.

tibia II; solenidion on genu of leg III shorter than solenidion on tibia III. Central claws on tarsi of all legs shorter than lateral claws (Fig. 336–337), empodia on tarsi of legs I and II bent nearly at a right angle and ambulacra only slightly bent, empodium of legs III turned onto ventral side at obtuse angle.

Measurements, $n=10$. Length of dorsal shield 295–345, width 180–220; length of anal plate 23–25, its width 32–36; length of capitulum 110–118; length of basal segment of chelicera 84–100, length of chelicera stylet 12–20; length of medial margin of coxae I 100–110, length of medial margin of coxae II+III 140–150; length of pedipalpal segments (P-1–5): 8–12, 35–45, 24–30, 8–12, 4–6; length of legs segments: I–Leg. 1–5: 36–44, 32–36, 40–45, 55–60, 68–76; II–Leg. 1–5: 40–43, 38–45, 40–46, 60–68, 84–92; III–Leg. 1–5: 40–45, 40–48, 44–50, 60–70, 84–96.

Female. (Only coxal plates, chelicera and pedipalps in satisfactory condition for description). Coxal plate I with 4 lateral thin setae, coxal plate II with 3 lateral thin setae, coxal plate III with one medial seta and 3–4 lateral setae, coxal plate IV with 2 medial setae and 4 lateral ones (Fig. 338). Apodeme beneath posteromedial medial edge of coxal plate I moderately developed and not extending beyond medial edge of coxal plate III. Suture line between coxal plates III and IV complete and oblique, directed posteromedially. Medial margin of coxal plate III shorter than medial margin of coxal plate IV. Posteromedial and posterolateral margins of coxae IV forming obtuse angle with short apodeme beneath this angle. Sclerites bearing setae *Hv* and other idiosomal setae situated on soft cuticle freely.

Chelicera with large basal segment and relatively small stylet (Fig. 339). Pedipalps rather



Figs 338–340. *Tiphys chaunensis*, female: 338 — coxal plates, 339 — chelicera, 340 — pedipalp. Scale bars: 338 = 100, 339–340 = 50.

slender (Fig. 340). Trochanter with single short dorsodistal seta, femur with 3 proximal and 2 dorsodistal setae; ventral margin of femur straight, ventral margin of genu slightly concave. Genu with 2 setae, base of external lateral seta located near middle of segment. Tibia rather slender, slightly tapering distally with straight ventral margin, with relatively short distolateral spine (2.5 times shorter than tarsus), 2 ventral setae, and several short and fine dorsal ones; both ventral setae inserted distally, ventral tubercles lacking. Pedipalpal tarsus tapering distally, with single long proximal solenidion, 5 thin setae and 4 thick distal unequal spines.

Measurements, $n=1$. Length of medial margin of coxa III 54, length of medial margin of coxa IV 72; length of basal segment of chelicera 205, length of cheliceral stylet 60; length of pedipalpal segments (P-1–5): 40, 95, 55, 108, 54; length of distolateral spine on tibia 21.

Ecology. Thermocarstic lake.

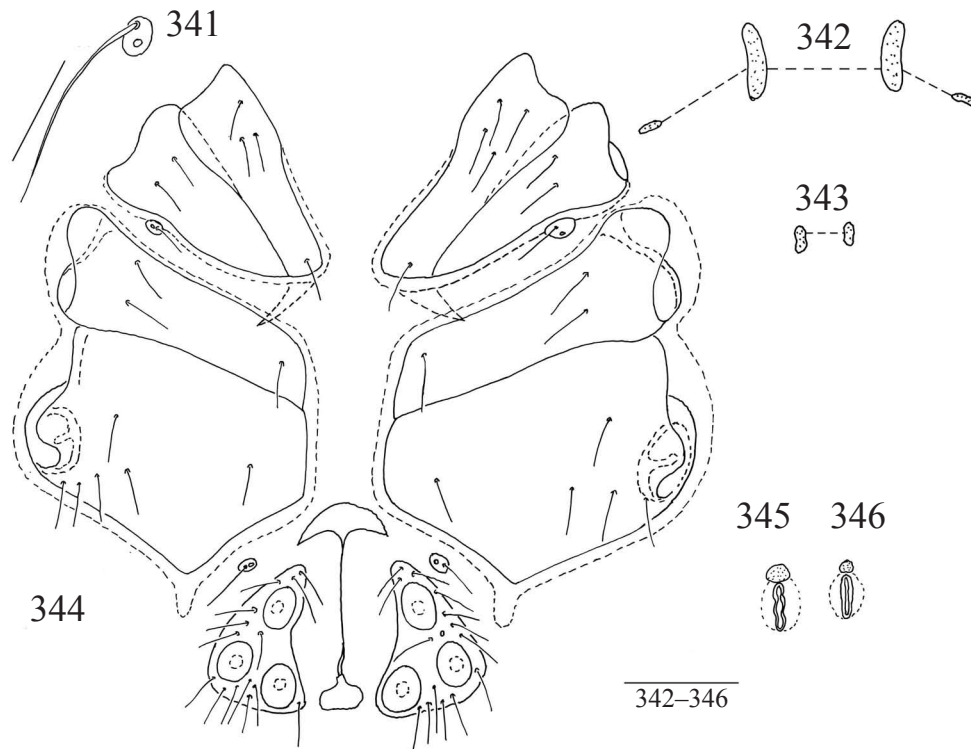
Geographical distribution. Asia, Russia: Magadan Province.

***Tiphys (Pionides) ensifer* (Müller, 1776)**

Figs 341–372

Material. 3 females Russia, Samara Province, National natural Park “Samara Luca”, village Koltsovo, sedge bog, May 1998; 10 females, 5 males, 1 deutonymph and 25 larvae reared in laboratory (IBIW): Russia, Yaroslavl Province, Nekouz Distr., Borok, temporary water bodies, sedge bogs, May–July, 2001–2002, 2004, P.V. Tuzovsky.

Diagnosis. Female. Medial margin of coxal plate III slightly shorter than medial margin of coxal plate IV. Sclerites bearing setae *Hv* and other ventral idiosomal setae situated on soft cuticle freely. Genital plates roughly triangular with 3 acetabula and 13–17 short and fine setae; all aceta-



Figs 341–346. *Tiphys ensifer*, female: 341 — seta *Fch*, 342 — anteromedial and anterolateral dorsal plates, 343 — posteromedial plates, 344 — ventral view, 345–346 — excretory pore. Scale bars: 341 = 50, 342–346 = 100.

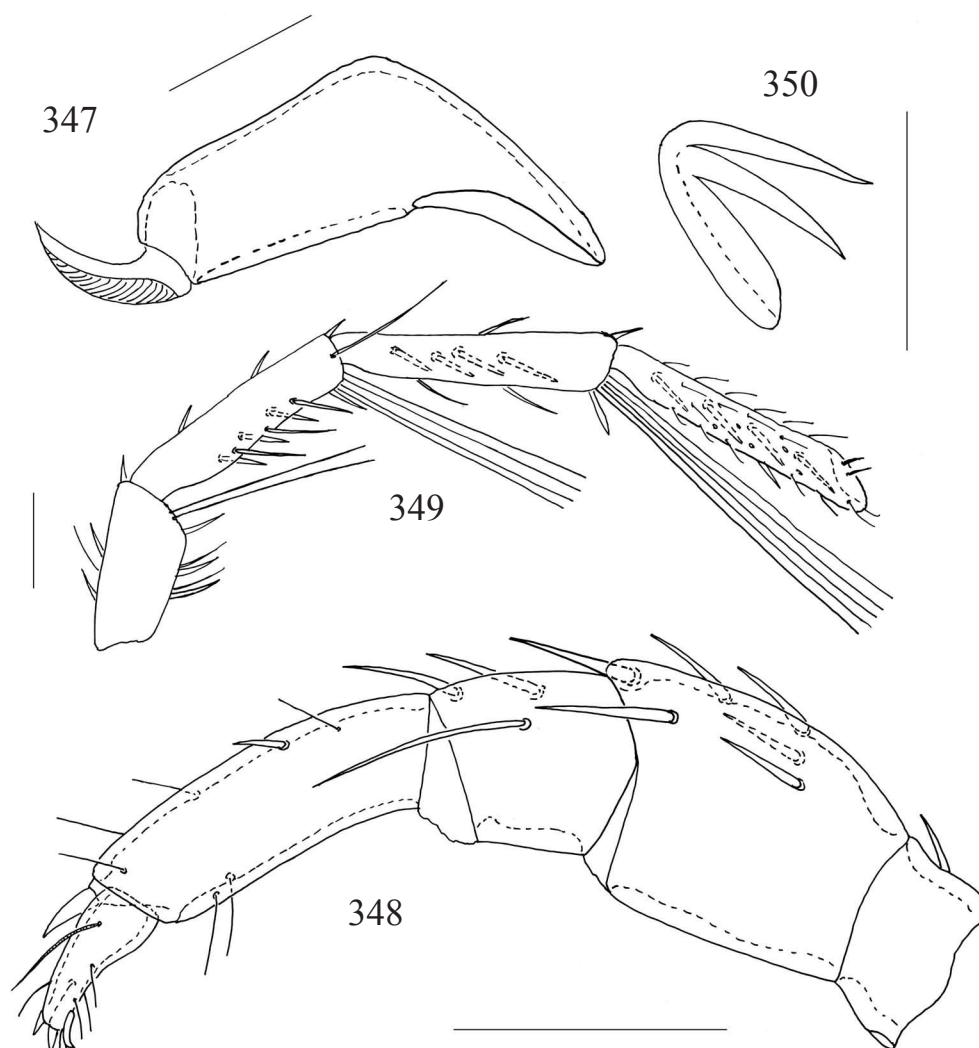
bula approximately subequal in sizes, and arranged in triangular. Genital opening and genital plates nearly subequal in length; anterior genital sclerite wider than posterior one. Pedipalpal genu usually with 3 setae, external lateral seta 2–3 times longer than other dorsal setae, base of external lateral seta located near middle of segment; tibia slender with short distolateral spine (2.5–3.0 times shorter than tarsus), both ventral setae attached near distal end of segment, ventral tubercles not developed. Claws of legs I–IV subequal in size; both denticles pointed and approximately subequal in length.

Male. Coxae plates IV greatly expanded and fused with one another posteromedially, posterior edge of coxal plate IV transverse and sinuous, forming convexity with lateral edge; medial margin of coxal plate IV 2.0–2.5 times longer than medial margin of coxal plate III, suture line between coxal plates III and IV nearly transverse; genital plates triangular and confined to gonopore region. Sclerites bearing setae *Hv* fused with posterior margin of coxae II; sclerites bearing other ventral idiosomal setae situated on soft cuticle freely. Telofemur IV with 2 long swimming setae, genu IV slightly expanded and bearing long, curved, spine-like seta dorsodistally, which shorter than of segment. Claw of legs I and II similar to female. Claws of legs III asymmetric; large claw with two more or less subequal denticles, external

denticle with short and thin dorsal spur; small claw with relatively long external denticles and short internal one. Claws of legs IV lesser than claws of legs I and II.

Deutonymph. Dorsum without true plates. Medial margin of coxae III and medial margin of coxae III subequal in length. Posteromedial angle of coxae IV obtuse with very short apodeme beneath this angle. Sclerites bearing setae *Hv* fused with posterior margin of coxae II; sclerites bearing other ventral idiosomal setae situated on soft cuticle freely. Both acetabula subequal in sizes, distance between them usually equal or lesser than diameter of acetabulum on each plate; genital sclerite considerably larger than pregenital one. Excretory pore with relatively large anterior sclerite and small posterior one. Pedipalpal genu with 2 setae, external lateral seta considerably longer than dorsodistal seta; base of external lateral seta attached distally to middle of segment; tibia with large distolateral spine (0.75–0.80 times as long as tarsus), ventral setae situated near distal end of segment, ventral tubercles lacking. Claws of legs I–IV subequal in size.

Larva. Dorsal shield elongate (ratio length/width 1.6–1.7), bearing 4 pairs of setae, setae *Fch* and *Vi* slightly longer and thicker than *Fp* and *Oi*. All coxal setae (C1–C4) subequal in length but C4 thicker than C1–C3, base of setae C4 inserted

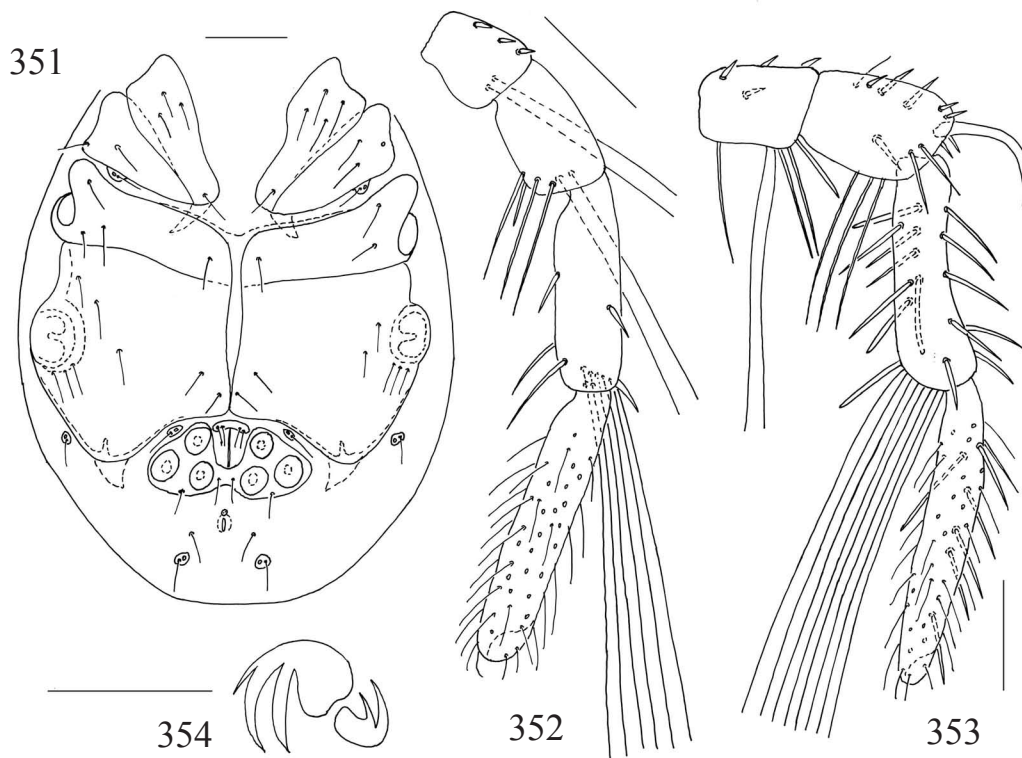


Figs 347–350. *Tiphys ensifer*, female: 347 — chelicera, 348 — pedipalp, 349 — telofemur, genu, tibia and tarsus of leg IV, 350 — claw. Scale bars: 347–350 = 100.

closely to beneath from medial end of suture line between coxal plates II and III. Transverse muscle attachment scar present. Dorsal shield and coxal plates porous. Excretory pore plate wider than long, setae *Ai* and *Ae* located near anterior margin of excretory pore plate, setae *Ae* slightly longer than *Ai*. Excretory pore open in posterior half of excretory pore plate. Solenidion on genu of leg I slightly longer than both solenidia on tibia I; solenidion on genu of leg II and both solenidia on tibia II approximately subequal in length.

Description. Female. Body oval; setae *Fch* long, whip-like (Fig. 341), other idiosomal setae filiform. Dorsum with relatively large anteromedial plates, small anterolateral and posteromedial platelets (Figs 342–343); anteromedial and posteromedial plates elongate, anterolateral plates transverse. Coxal plate I usually with 4(3) lateral thin setae and 1 medial thin seta, coxal plate II with 2 lateral thin setae, coxal plate III with one

medial seta and 2–3 lateral setae, coxal plate IV with 1 medial seta and 4–5 lateral setae (Fig. 344). Apodeme beneath posteromedial medial edge of coxal plate I moderately developed and usually in immature specimens extending beyond medial edge of coxal plate III. Suture line between coxal plates III and IV complete and oblique, directed posteromedially. Medial margin of coxal plate III slightly shorter than medial margin of coxal plate IV. Posteromedial and posterolateral margins of coxae IV forming obtuse angle with short apodeme beneath this angle. Sclerites bearing setae *Hv* close or fused to posterior margin of coxal plate II, other idiosomal setae situated on soft cuticle freely. Genital plates roughly triangular with 3 acetabula and 13–17 short and fine setae; acetabula in triangular approximately equal in size; acetabula occupy about half-surface of genital plate. Genital opening and genital plates nearly equal in length; anterior genital sclerite wider than poste-



Figs 351–354. *Tiphys ensifer*, male: 351—ventral view, 352—telofemur, genu, tibia and tarsus of leg III, 353—telofemur, genu, tibia and tarsus of leg IV, 354—claws of leg III. Scale bars: 351–353 = 100, 354 = 50.

rior one. Excretory pore usually with small anterior sclerite (Fig. 345–346).

Capitulum with short anchoral projection, both pairs of setae equal in length. Chelicera (Fig. 347) with large basal segment and relatively small pointed stylet.

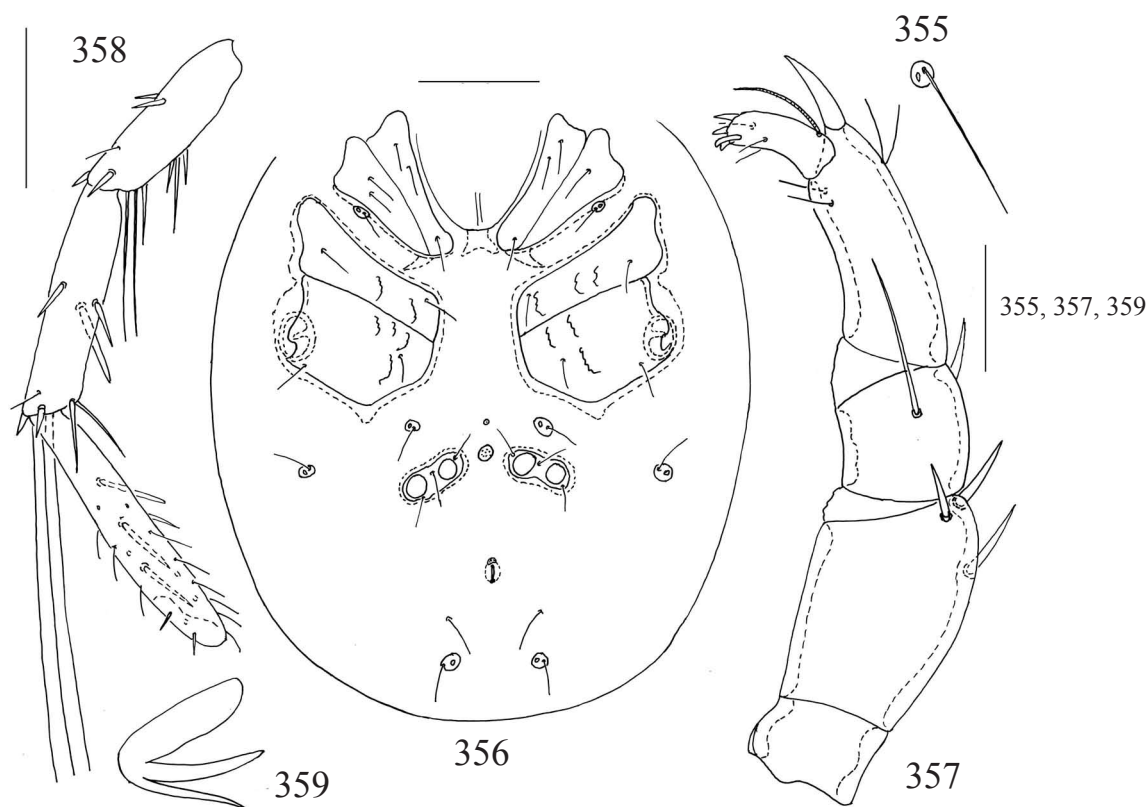
Pedipalps slender (Fig. 348). Trochanter with 1 short dorsodistal seta, femur with 3–5 proximal and 2 dorsodistal setae; ventral margin of femur straight or slightly convex, ventral margin of genu straight or slightly concave. Genu with 3 setae, external lateral seta 2–3 times longer than other dorsal setae; base of external lateral seta located near middle of segment. Pedipalpal tibia slender, slightly tapering distally, with short dorsodistal spine (2.5–3.0 times shorter than tarsus), 2 ventral setae, several short and fine dorsal setae and 1 thick spine proximally to middle of segment; both ventral setae attached near distal end of tibia, ventral tubercles not developed. Pedipalpal tarsus tapering distally, with 1 long proximal solenidion, 5 thin setae and 4 thick distal unequal spines.

All legs with swimming setae; legs I and II with short swimming setae, two posterior pairs of legs with long swimming ones (Fig. 349). One swimming seta present on genu I, 1–2 on telofemora III–IV and genu III, 2 on tibia I and genu II, 3–4 on genu IV and tibia II, 4–7 on tibia III, and

5–6 on tibia IV. Claws of legs I–IV equal in size; both denticles pointed and approximately subequal (Fig. 350). Claw lamella moderately developed, with slightly convex ventral margin.

Measurements (n=10). Body length 600–855, length of medial margin of coxa III 54–60, length of medial margin of coxa IV 65–79; length of anteromedial dorsal plates 60–72, width 15–25, length of genital plates 120–140, width 65–75; length/width of genital acetabula (*ac.* 1–3): 42–48/24–30, 36–45/28–30, 42–50/35–42; width of anterior genital sclerite 60–95; length of basal segment of chelicera 165–170, length of cheliceral stylet 55–60; length of pedipalpal segment (P-1–5): 40–50, 120–140, 70–85, 130–165, 55–60; length of distolateral spine on tibia 20–26; length of leg segments: I–Leg. 1–6: 65–85, 120–130, 120–130, 135–155, 160–180, 225–270; II–Leg. 1–6: 72–85, 120–135, 115–140, 135–165, 170–195, 225–270; III–Leg. 1–6: 70–90, 115–140, 105–130, 135–165, 175–205, 220–260; IV–Leg. 1–6: 120–150, 140–155, 145–175, 195–235, 185–200, 240–295.

Male. Dorsal surface, capitulum, chelicera and pedipalps similar to those in female. Anterior apodemes rather large, extending beyond medial edge of coxal plate III; posterior apodemes small (Fig. 351). Coxae plates IV greatly expanded, fused with one another posteromedially, with 2



Figs 355–359. *Tiphys ensifer*, deutonymph: 355 — seta Fch, 356 — ventral view, 357 — pedipalp, 358 — genu, tibia and tarsus of leg IV, 359 — claw. Scale bars: 355, 357, 359 = 50; 356, 358 = 100.

short and fine setae close together anterior to depressed region on each plate. Posteromedial edge of coxal plate IV transverse and sinuate, forming convexity with lateral edge. Medial margin of coxal plate IV approximately twice as long as medial margin of coxal plate III. Suture line between coxal plates III and IV nearly transverse. Genital plates triangular and confined to gonopore region; all acetabula relatively large, subequal and occupy more than half of plate surface. Anterior genital sclerite small with two pairs of short and fine setae. Genital plates with 2–3 short and fine setae each. Sclerites bearing setae *Hv* fused with posterior margin of coxae II; sclerites bearing other ventral idiosomal setae situated on soft cuticle freely. Excretory pore with small anterior sclerite.

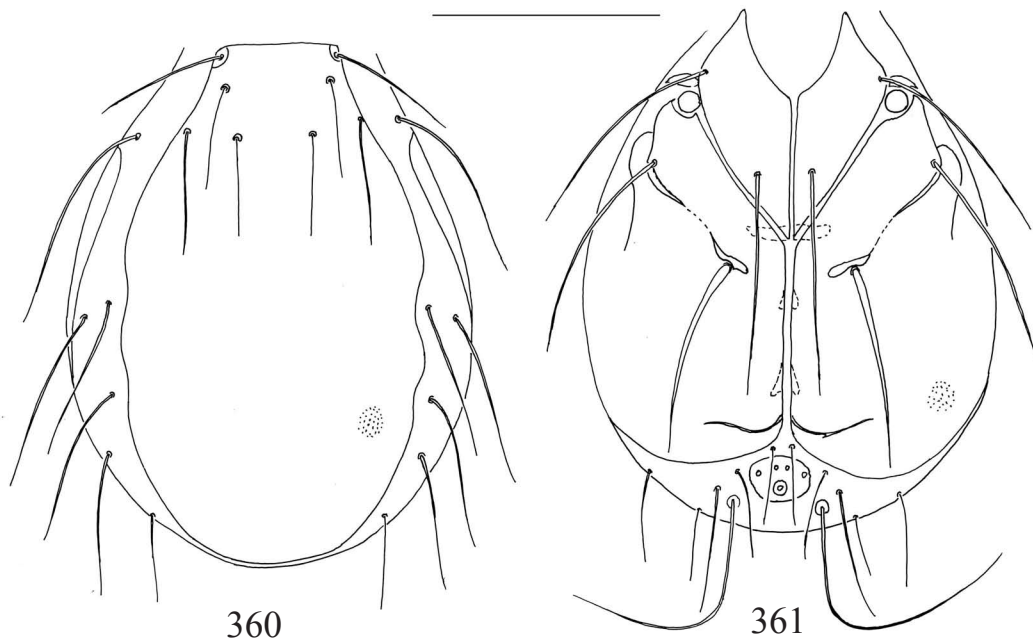
Genu of leg III (Fig. 352) shorter than tibia III, tarsus III considerably longer than tibia III; telofemur III with 2, genu III with 2–3, and tibia III with 5–6 long swimming setae. Telofemur IV (Fig. 353) with 2 long ventrodistal swimming seta; genu IV slightly expanded dorsoventrally relatively telofemur and bearing large curved seta dorsodistally, it shorter than of segment. Tibia IV with slightly concave dorsal margin, with a few short and thick setae, and 6–8 ventrodistal long swimming setae. Tarsus IV slightly tapering distally,

with numerous short and thin setae and 5–8 thick unequal ones.

Claw of legs I and II similar to those in female. Claws of legs III (Fig. 354) asymmetric; large claw with subequal denticles, external denticle with short and thin dorsal spur; small claw with long external denticles and relatively short internal one.

Measurements, $n=5$. Body length 570–700, length of medial margin of coxa III 70–90, length of medial margin of coxa IV 150–180; length of anteromedial dorsal plates 36–48, width 9–12; length of genital plates 80–105, their general width 175–215; length/width of genital acetabula (*ac.* 1–3): 24–36/24–30, 30–36/24–30, 30–38/24–32; length of basal segment of the chelicera 105–130; length of cheliceral stylet 40–50; length of pedipalpal segment (P-1–5): 32–40, 95–115, 60–65, 120–140, 40–50; length of distolateral spine on tibia 15–21; length of leg segments: I–Leg. 1–6: 60–75, 105–125, 115–130, 130–155, 155–175, 250–270; II–Leg. 1–6: 70–85, 115–130, 115–140, 145–165, 170–195, 250–270; III–Leg. 1–6: 70–85, 80–90, 55–75, 80–90, 130–145, 195–205; IV–Leg. 1–6: 105–130, 105–125, 95–100, 120–130, 175–220, 270–285.

Deutonymph. Dorsum without true plates. Setae *Fch* long, thin (Fig. 355). Coxal plate I with



Figs 360–361. *Tiphys ensifer*, larva: 360 — dorsal view, 361 — ventral view. Scale bar: 360–361=100.

2 lateral thin setae and 1 posteromedial thin seta, coxal plate II with 1 lateral thin setae, coxal plate III with 1 medial seta and 1 lateral thin setae, coxal plate IV with 1 medial seta and 1 lateral one (Fig. 356). Apodeme beneath posteromedial medial edge of coxal plate I moderately developed not extending posteriorly to beneath medial edge of coxal plate III. Suture line between coxal plates III and IV oblique, directed posteromedially. Medial margin of coxae III and medial margin of coxae IV subequal in length. Posteromedial angle of coxae IV obtuse, with very short apodeme beneath this angle. Sclerites bearing setae *Hv* fused with posterior margin of coxae II; sclerites bearing other ventral idiosomal setae situated on soft cuticle freely. Genital plates separated, oblique, directed anteromedially, bearing 2 acetabula and 3 short and fine setae each. Both acetabula subequal in size, distance between them usually equal to or lesser than one diameter of acetabulum on each plate. Genital sclerite larger than pregenital sclerite. Excretory pore with small anterior sclerite.

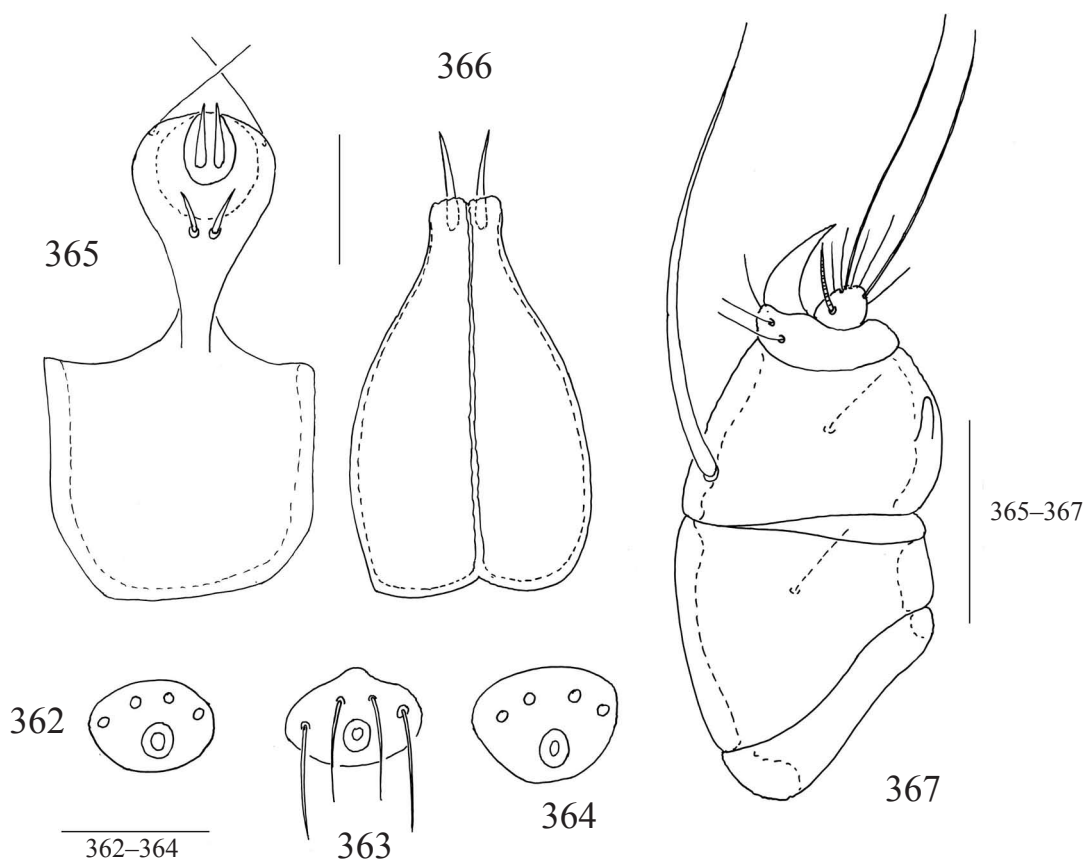
Pedipalpal trochanter without seta, femur with 3 dorsodistal setae (Fig. 357). Ventral margin of femur straight, ventral margin genu slightly concave. Genu with 2 setae, external lateral seta considerably longer than dorsodistal one; base of external lateral seta attached distally to middle of segment. Tibia with very long dorsodistal spine, 2 ventral and 1–2 dorsodistal setae; ventral setae and situated near distal end of segment, ventral tubercles lacking. Dorsodistal spine of tibia 0.75–

0.80 times as long as tarsus. Pedipalpal tarsus with single long proximal solenidion, 3 thin setae and 4 short, thick distal spines.

Legs II–IV with swimming setae; second pair of legs with short swimming setae, legs III–IV with long swimming ones (Fig. 358). Genu II and III with 1 swimming seta, tibia II–III and genu IV with 2, and tibia IV with 3 swimming setae. Claws of legs I–IV subequal in sizes; both denticles approximately subequal in length, external denticle thin-pointed, and internal denticle relatively wide (Fig. 359). Claw lamella slightly developed, with nearly straight ventral margin.

Measurements, $n=1$. Body length 510; length of medial margin of coxa III 35, length of medial margin of coxa IV 35–37; length of genital plates 60, width 30; diameter of genital acetabula (*ac.* 1–2): 18–21, 18–22; length of basal segment of chelicera 90; length of cheliceral stylet 40; length of pedipalpal segment (P-1–5): 24, 66, 42, 72, 36; length of distolateral spine on tibia 27; length of leg segments: I–Leg. 1–6: 42, 55, 54, 72, 88, 120, II–Leg. 1–6: 48, 51, 54, 78, 95, 125; III–Leg. 1–6: 48, 48, 54, 72, 102, 125; IV–Leg. 1–6: 72, 60, 75, 102, 132, 150.

Larva. Body small and oval; dorsal shield truncate anteriorly, rounded posteriorly, with convex wavy lateral edges, its anterolateral margins are weakly concave (Fig. 360). Dorsal shield elongate (ratio length/width 1.6–1.7), covering almost all dorsum in unengorged larva and bearing 4 pairs of setae (*Fp*, *Oi*, *Fch*, *Vi*), all setae approximately



Figs 362–367. *Tiphys ensifer*, larva: 362–364 — excretory pore plate, 365 — capitulum (ventral view), 366 — chelicerae, 367 — pedipalp. Scale bars: 362–364 = 25, 365–367 = 20.

subequal in length, but setae *Fch* and *Vi* thicker than *Fp* and *Oi*. Setae *Oe*, *Hi*, *He*, *Sci*, *Sce* and *Li* located on the soft wrinkled membrane. Setae *Oe* longest of all dorsal setae, setae *Sce* longer than setae *Li*. Lateral sides of coxae II+III coming onto dorsal side and almost extending to setae *Oi* and other hysterosomal setae located on interscutal membrane. Dorsal shield porous.

Coxal plates I–II relatively small; anterior coxal plates are separated from coxal plates II and III, which are fused, suture line between them incomplete and developed only in their lateral parts (Fig. 361). Anterior margin of coxal plates I concave and considerably shorter than posterior one. All coxal setae (C1–C4) approximately equal in length, base of setae C4 on coxal plate III inserted closely to medial end of suture line between coxal plates II and III. Posteromedial apodemes of coxal plates I well developed, posteromedial apodemes of coxal plates II and III small. Transverse muscle attachment scar situated near posterior margin of coxal plate III. Setae *Ci*, *Si*, *Se*, *Le*, *Pi*, *Pe* situated on soft interscutal membrane in posterior part of body. Setae *Ci* very long and heaviest than other ventral idiosomal setae, and situated on small bases; setae *Si*

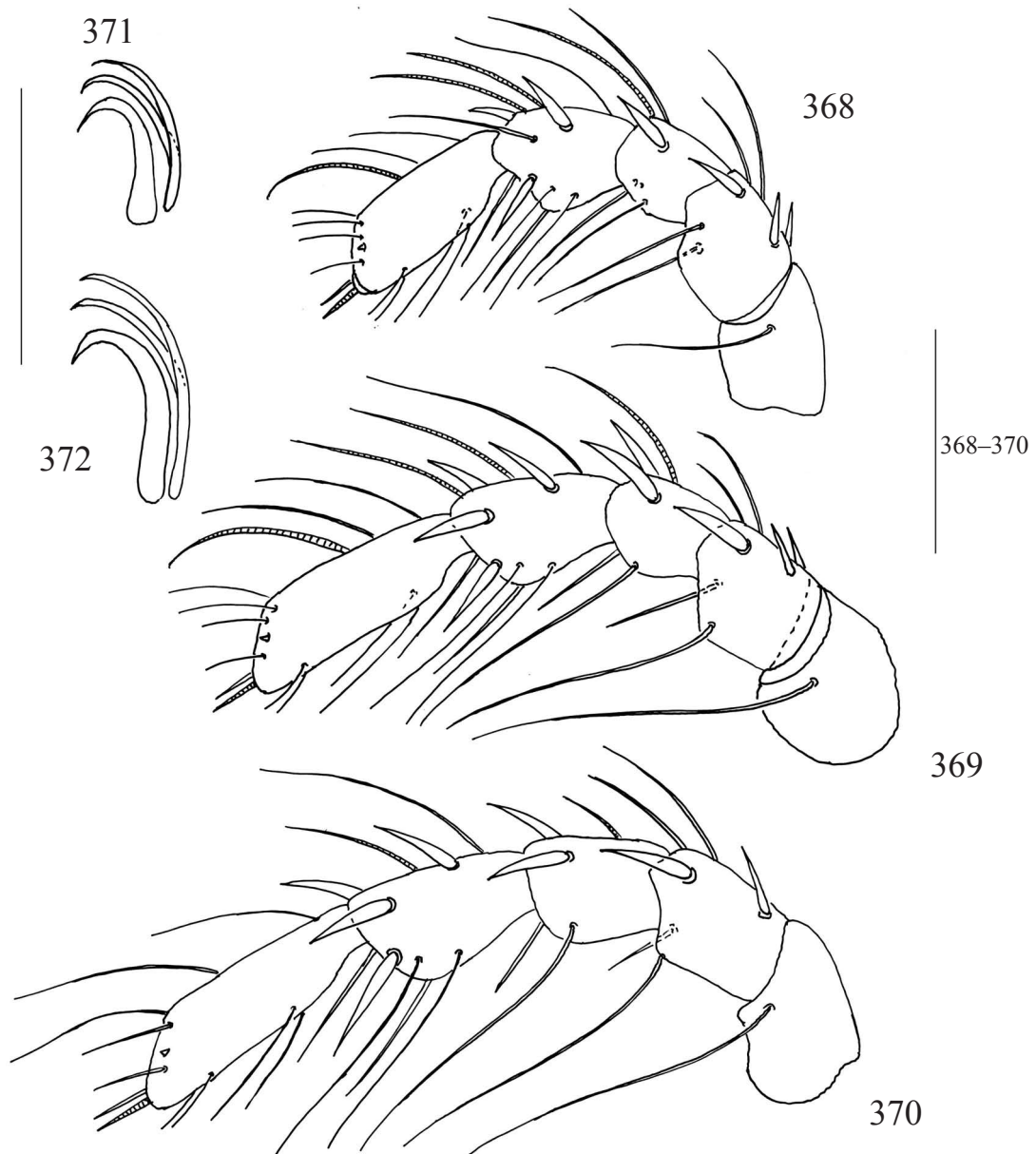
considerably shortest than setae *Se*. Coxal plates I–III porous. Urstigma occupying lateral position on body border between coxae I and II and provided with cups.

Excretory pore wider than long (Figs 362–364). Both pairs of anal setae situated near anterior margin of excretory pore plate, setae *Ae* longer than setae *Ai*. Excretory pore placed in posterior half of excretory pore plate.

Capitulum (Fig. 365) elongate, with rather wide base, anterior hypostomal setae long, thin, posterior hypostomal setae short and thick. Basal segments of chelicerae (Fig. 366) fused at their medial parts and tapering proximally, suture line well developed along their whole length. Cheliceral stylet small, crescent.

Pedipalp trochanter (Fig. 367) short and without setae; lateral seta of femur and genu thin, short and approximately of similar length, proximal lateral genual seta long and very thick; tibia with 3 approximately subequal setae and large dorsodistal claw; tarsus with one rather long solenidion, 2 long and 5 unequal simple setae.

All legs short, stout. The general number of setae on legs I–III (Figs 368–370), except eupathidia, as follows: I–Leg. 1–5: 1, 7, 5 (s), 11



Figs 368–372. *Tiphys ensifer*, larva: 368 — leg II, 369 — leg III, 370 — claws of leg I, 371 — claws of leg I, 372 — claws of leg III. Scale bars: 368–370 = 50, 371–372 = 25.

(2s), 13 (s, ac); II–Leg. 1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5: 1, 6, 5(s), 10 (s), 11 (ac). Formula of large setae on leg segments as follows: I–Leg. 1–5: 0, 3, 1, 3, 0; II–Leg. 1–5: 0, 3, 2, 4, 0; III–Leg. 1–6: 0, 2, 2, 4, 0. Solenidion on genu of leg I slightly longer than both solenidia on tibia I; solenidion on genu II and both solenidia on tibia II approximately subequal in length; solenidion on genu of leg III shorter than solenidion on tibia III. Central claw and lateral claws on tarsi of all legs nearly subequal in length (Fig. 371–372); tarsi of all legs with hook-like empodium, and lateral claws slightly bent.

Measurements, $n=10$. Length of dorsal shield 200–210, width 120–130; length of excretory pore

plate 16–18, width 20–25; length of capitulum 70–75; length of basal segment of chelicera 64–68, length of chelicera stylet 12–14; length of medial margin of coxae I 64–68, length of medial margin of coxae II+III 83–93; length of pedipalpal segments (P-1–5): 6–8, 24–26, 20–22, 7–8, 4–6; length of legs segments: I–Leg. 1–5: 23–25, 19–21, 22–24, 28–30, 41–44; II–Leg. 1–5: 30–33, 25–28, 24–27, 33–36, 50–52; III–Leg. 1–5: 30–33, 30–33, 25–28, 40–43, 51–54.

Ecology. Temporary ponds, sedge-sphagnum bogs, lakes. Also in permanent waters.

Geographical distribution. Europe, Asia (Viets 1936, 1956; Sokolow 1940; Lundblad, 1968; K.O. Viets 1978).

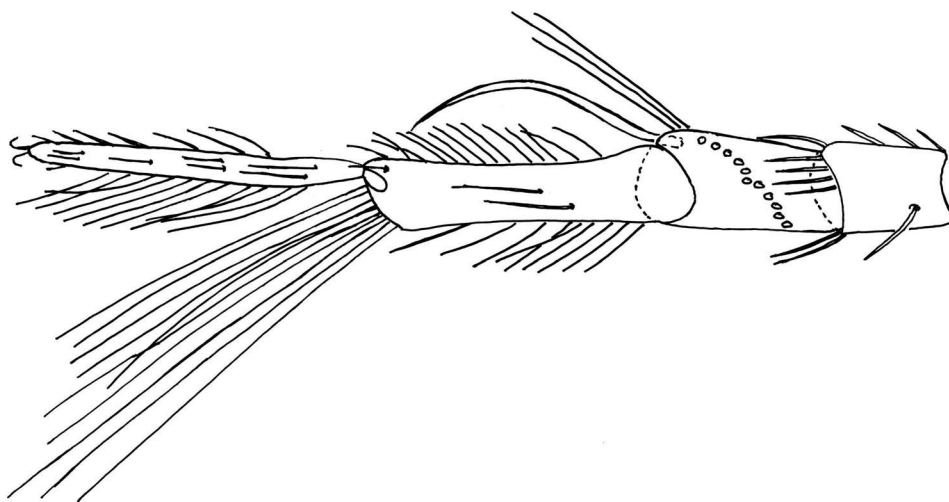


Fig. 373. *Tiphys uchidai*, male: 373 — telofemur, genu, tibia and tarsus of leg IV, from Uchida (1936). Distal short setae in genu IV are not show.

***Tiphys (Pionides) uchidai* Viets, 1956**

Fig. 373

Uchida (1936) gave brief characteristics and illustrated the telofemur, genu, tibia and tarsus IV of *T. ensifer* (Fig. 373) from the island of Sakhalin, which he has assigned to *T. ensifer* var. Karl Viets (1956) elevated this variety to the rank of subspecies (*T. ensifer uchidai*), while K.O. Viets (1987) considered it a full species, *T. uchidai* Viets, 1956.

Remarks. The legs IV of *T. ensifer* differ from the legs IV of *T. uchidai* by the following features (characters states of *T. uchidai* are indicated in parentheses based on Uchida 1936): telofemur with 2 long swimming setae, Fig. 353 (without swimming setae, Fig. 373), genu with relatively short curved seta dorsodistally, its length shorter than of segment (with long curved seta dorsodistally, its length longer than of segment).

***Tiphys (Acercopsis) pistillifer* (Koenike, 1908)**

Figs 374–410

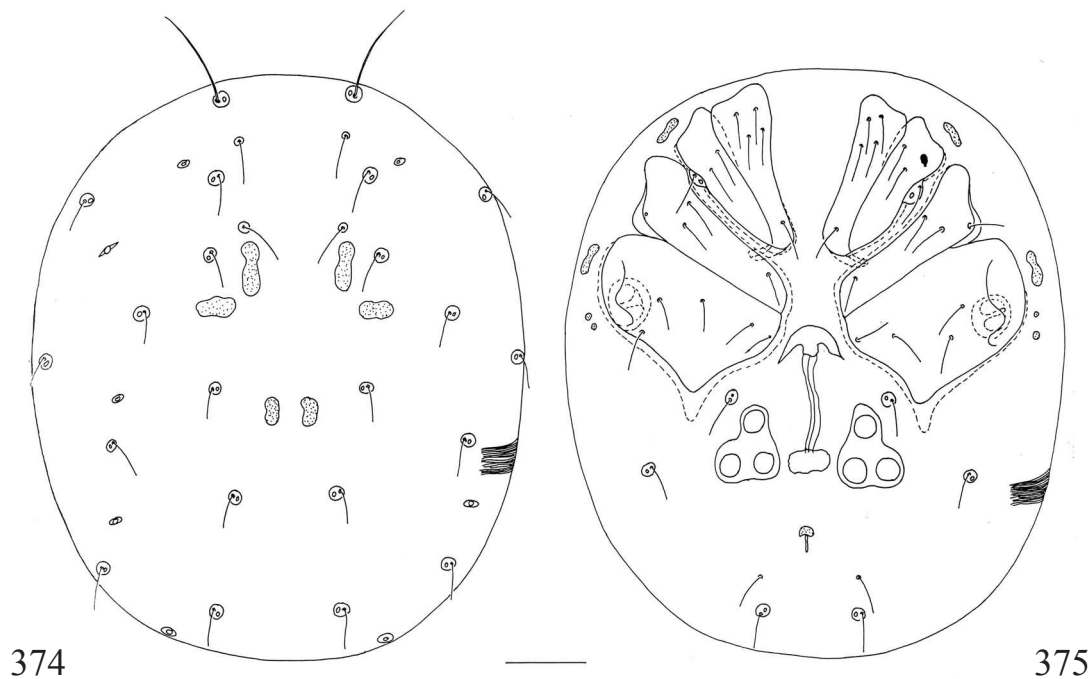
Material. 12 females, 5 males and 17 larvae reared in laboratory (IBIW): Russia, Yaroslavl Province, Nekouz Distr., Borok, forest sedge bog near the settlement, April–August 2000–2003, P.V. Tuzovsky.

Diagnosis. Female. Dorsum with 3 pairs of plates, venter with two pairs of rather large elongate platelets and two pairs of small sclerites is present along a lateral line of a body. Medial margin of coxae III and IV approximately equal in length. Sclerites bearing setae *Hv* fused with posterior margin of coxae II. Genital plates triangular, genital opening approximately 1.5 times as long

as genital plates. Pedipalpal genu with 3 setae, external lateral seta longer than two other setae; base of external lateral seta situated near to middle of segment; tibia rather slender with short distolateral spine (2.5 times shorter than tarsus), internal ventral seta situated on relatively large conic tubercle, external ventral seta is on very small tubercle. Internal denticle of claw of legs I–III wide with roundish tip, external denticle thin and pointed. Claws of legs IV with short internal and long external denticles, latter supplied with short spur.

Male. Coxae IV greatly expanded, their length exceeding total length of coxae I–III. Medial margin of coxae III in 2.0–2.7 times shorter than length of medial margin of coxae IV. Genital plates fused by anterior and posterior ends, acetabula arranged in an arc; genital setae clustered in four groups, two anterior groups have a few setae (6–11), two posterior groups with more numerous setae (11–19). Sclerites, bearing setae *Pe*, fused with posteromedial margin of coxae IV; sclerites, bearing setae *Hv*, fused with posterior margin of coxae II. Tibia of legs II with single spatulate seta. Genu of leg IV expanded proximally, tibia IV curved slightly thickened near middle, with distolateral leaf-shaped seta. Claws of legs III asymmetric with 3 unequal denticles each, large claw with rather long internal and median denticles and short external one; small claw with long median denticle and short internal and external ones, all denticles pointed.

Larva. Dorsal shield elongate (ratio length/width 1.4–1.6), covering almost all dorsum in unengorged larvae and bearing two pairs of trichobothria (*Fp*, *Oi*). Setae *Fch* situated in anterolateral corners of dorsal shield, and setae *Vi* occupying



Figs 374–375. *Tiphys pistillifer*, female: 374 — dorsal view, 375 — ventral view. Scale bar: 374–375 = 100.

lateral position; both these pairs of setae in immature specimens separated from dorsal shield. Setae C1 shorter than setae C2–C4 which approximately equal in length. Base of setae C4 on coxal plate III located near medial end of suture line between coxal plates II and III. Transverse muscle attachment scar present. Dorsal shield and coxal plates I–III with pore like structure and slightly developed reticulations on it. Excretory pore plate wider than long, ratio length/width = 0.6–0.7; setae *Ai* and *Ae* approximately equal in size. Excretory pore located in posterior half of excretory pore plate. Solenidion on genu of leg I longer than solenidia on tibia I; solenidia on genu and tibia of legs II equal in size.

Description. Female. Body oval; setae *Fch* long, whip-like, other idiosomal setae filiform (Fig. 374). Integument soft, with very fine strips. Dorsum with rather large anteromedial, relatively small anterolateral and posteromedial plates. Medial and posterior plates elongate, lateral plates transverse. The first four pairs of lyriform organs (*il*–*i4*) located on dorsum, *i5* in the posterior part of the dorsum or the venter.

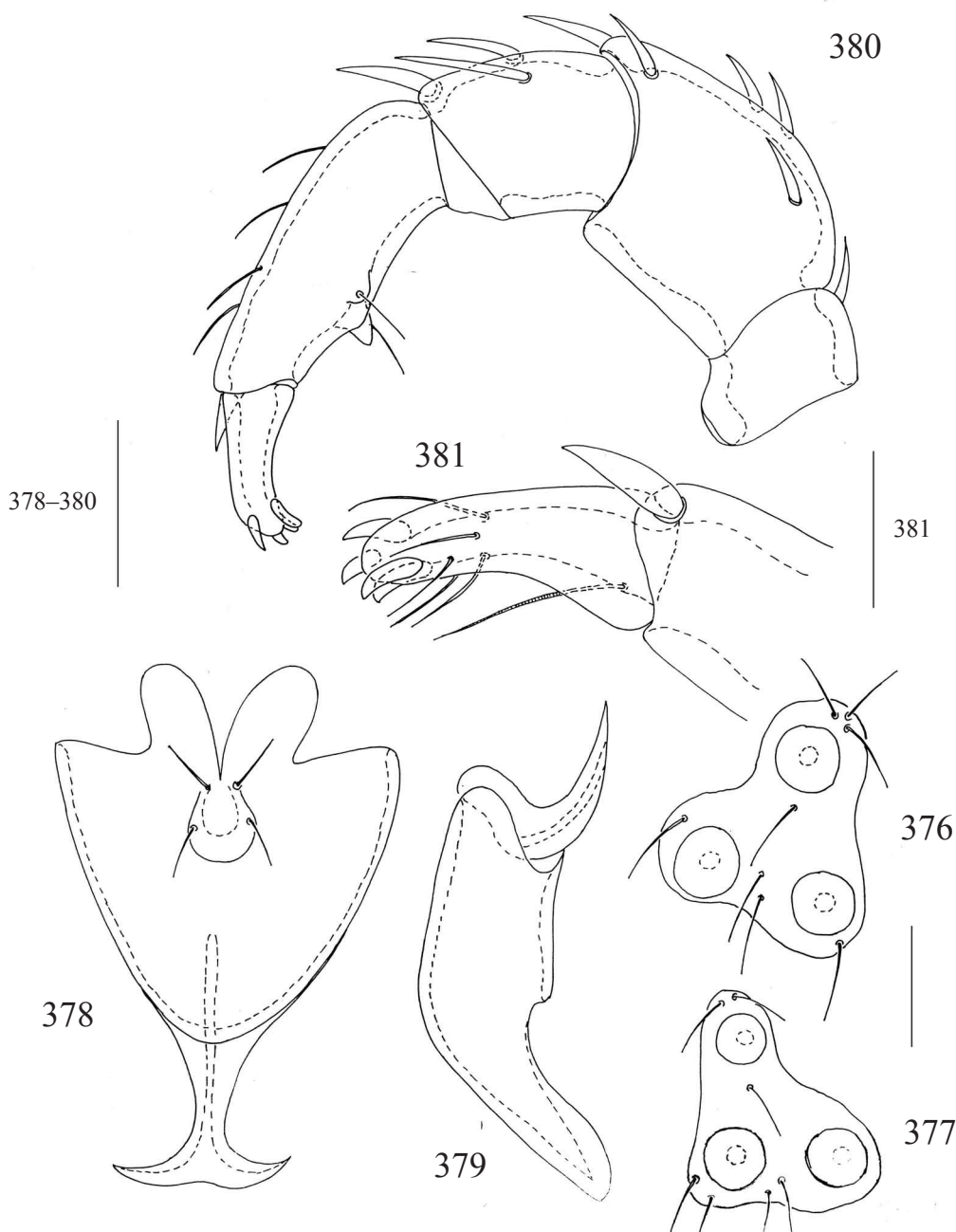
Anterior groups of coxae with rather large apodemes (Fig. 375). Medial margin of coxae III and IV approximately equal in length. Suture line between coxal plates III and IV obliquely posteromedially-directed. Posteromedial margin of coxal plate IV concave, and forming roughly right posteromedial angle with lateral margin. Surface of

all coxae with pore-like structure on it. Sclerites bearing setae *Hv* fused with posterior margin of coxae II; sclerites bearing other ventral idiosomal setae situated freely on soft cuticle. Two pairs of rather large elongate platelets and two pairs of small sclerites present along lateral idiosoma margins.

Genital plates triangular (Figs 376–377), with 3 acetabula and 6–9 thin short setae each. Lateral margins of genital plates distinctly concave. All acetabula approximately equal in size; distance between first and second acetabula, and distance between first and third acetabula more than diameter one acetabulum; distance between second and third acetabula usually lesser than diameter one acetabulum. Anterior genital sclerite wider than posterior one. Genital opening approximately 1.5 times longer than genital plates.

Capitulum with rather large anchoral projection, both pairs of setae equal in length (Fig. 378). The basal segment of chelicera (Fig. 379) convex, cheliceral stylet relatively large, pointed.

Pedipalps (Fig. 380) relatively short, stout. Trochanter with single dorsodistal seta. Ventral margin of femur and genu of pedipalp straight. Femur with 3–4 proximal and 2 dorsodistal short setae. Pedipalpal genu with 3 setae, external lateral seta longer than two other setae; base of external lateral seta situated near middle of segment. Pedipalpal tibia with rather large distolateral spine (2.5 times shorter than tarsus), 2 ventral and 2–4 dorsal



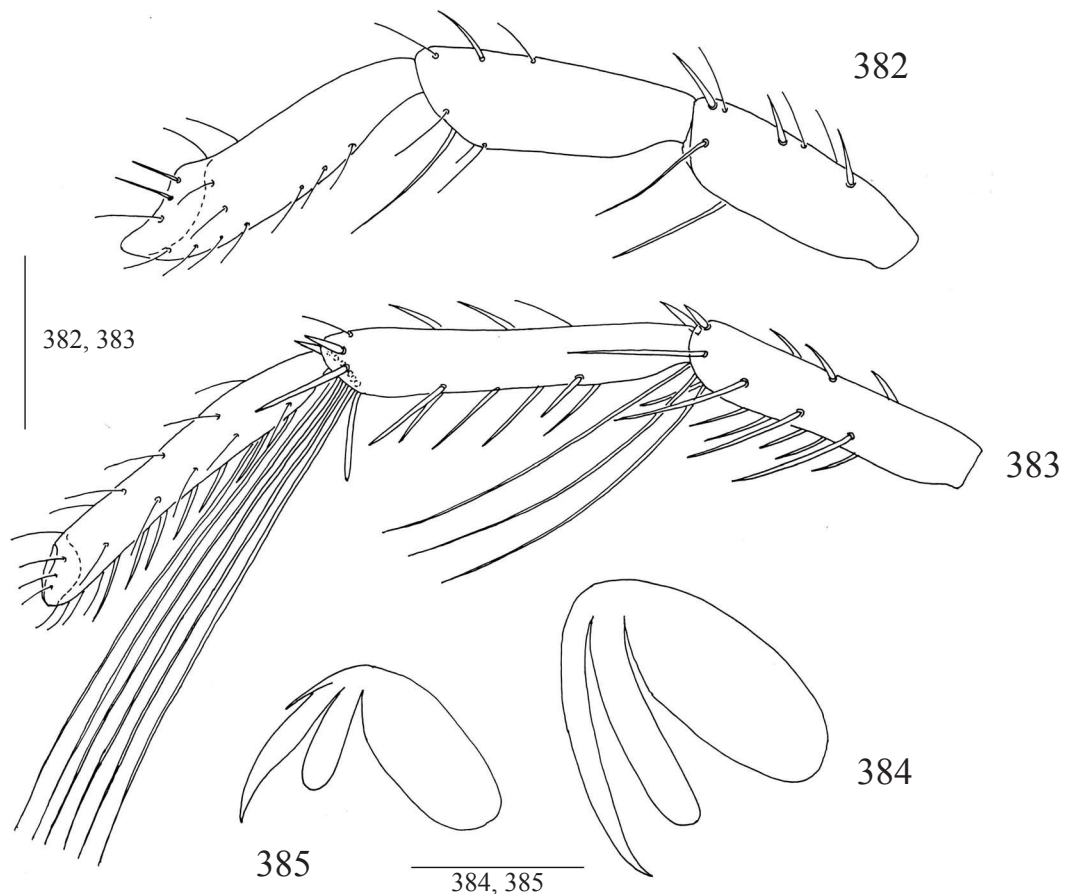
Figs 376–381. *Tiphys pistillifer*, female: 376–377 — genital plate, 378 — capitulum, ventral view, 379 — chelicera, 380 — pedipalp, 381 — distal part of pedipalpal tibia and tarsus. Scale bars: 376–380 = 50, 381 = 20.

setae. Internal ventral seta on tibia situated on relatively large conic tubercle, base of external ventral seta on very small tubercle. Pedipalpal tarsus (Fig. 381) with 1 long proximal solenidion, 5 thin setae and 4 thick unequal dorsodistal spines.

Two anterior pairs of legs without true swimming setae (Fig. 382). Three relatively short swimming setae present on genu III, 3–4 on genu IV, 4(3) long swimming setae on tibia III and 5–7 on tibia IV (Fig. 383). Claws of legs I–III larger than claws of legs IV. Internal denticle of claw of legs I–III wide with roundish tip, external denticle thin and pointed (Fig. 384). Claws of legs IV with short

internal and long external denticles, latter supplied with short spur (Fig. 385).

Measurements, $n=10$. Body length 685–800; length of medial margin of coxa III 45–55, length of medial margin of coxa IV 40–50; length of genital plates 85–105, width 65–80; length of genital acetabula (*ac.* 1–3) — 25–30, 25–30, 25–30; length of basal segment of chelicera 145–155; length of cheliceral stylet 54–60; length of pedipalpal segment (P-1–5) — 25–30, 90–97, 54–60, 90–105, 42–48; length of leg segments: I-Leg. 1–6 — 50–60, 60–80, 75–90, 100–120, 115–140, 135–165; II-Leg. 1–6 — 60–65, 60–75, 85–90,



Figs 382–385. *Tiphys pistillifer*, female: 382 — genu, tibia and tarsus of leg I, 383 — genu, tibia and tarsus of leg IV, 384 — claw of leg II, 385 — claw of leg IV. Scale bars: 382–383 = 70, 384–385 = 20.

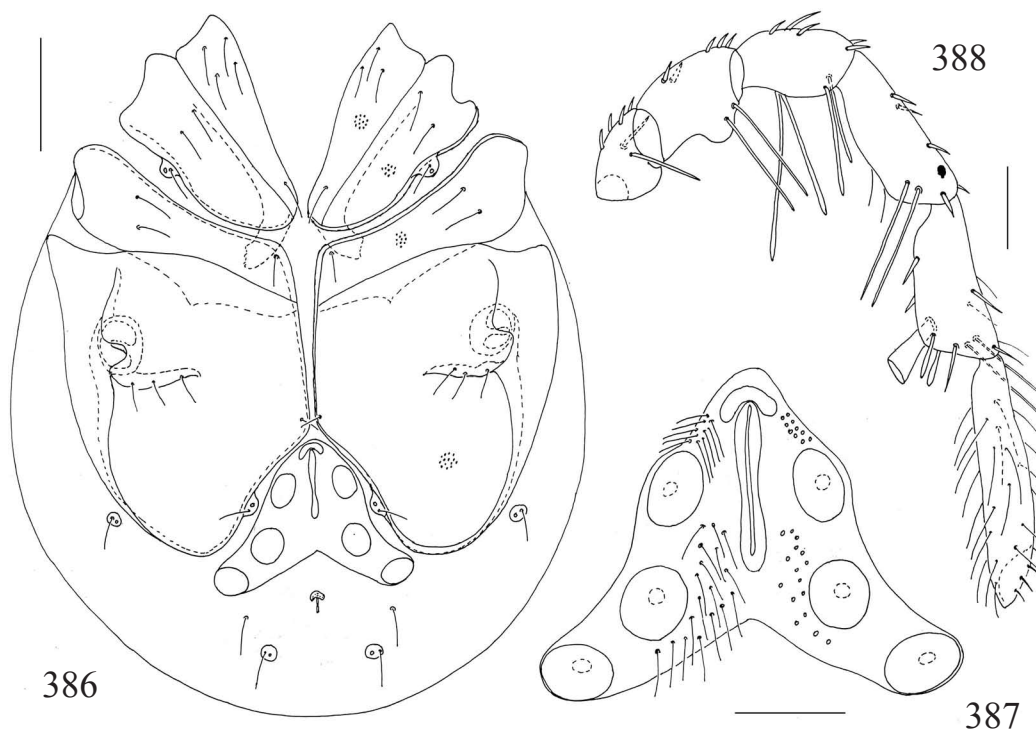
105–120, 120–150, 135–170; III–Leg. 1–6 — 65–72, 60–80, 70–85, 100–120, 135–165, 135–165; IV–Leg. 1–6 — 100–125, 75–95, 95–120, 155–180, 185–210, 180–210.

Male. Dorsal surface, capitulum, chelicerae and coxae of legs I–III similar to female. Coxal plates in four groups and occupying most of ventral surface (Fig. 386). Anterior apodemes rather large, extending beyond medial edge of coxal plate III; posterior apodemes not developed. Coxae IV greatly expanded, their length exceeding total length of coxae I–III. Medial margin of coxae III 2.0–2.7 times shorter than medial margin of coxae IV. Posteromedial margin of coxae IV oblique and forming bay where external genital organ situated; lateral edge of these coxae convex. Genital plates fused by anterior and posterior ends, acetabula arranged in an arc. Anterior and posterior acetabula oval, median acetabula usually rounded. Lateral margins of genital plate weakly concave; posterior margins converge at blunt angle. Genital setae clustered in four groups (Fig. 387); two anterior groups have few setae (6–11) and located in two-three rows in the anterior part of plate, two poste-

rior groups with more numerous setae (11–19). Sclerites bearing setae *Pe* fused with posteromedial margin of coxae IV; sclerites bearing setae *Hv* fused with posterior margin of coxae II; other sclerites bearing ventral idiosomal setae situated on soft cuticle. Excretory pore with small anterior sclerite.

Pedipalps similar to female, but tibia with more numerous dorsal setae.

Basifemur II (Fig. 388) with relatively large ventrodistal hump, tibia II with single spatulate seta. Tibia III (Fig. 389) with 6–7 long swimming setae. Genu IV (Fig. 390) expanded proximally, with maximal height in the middle of segment, bearing 10–12 short, bent dorsal setae with round tips; ventral surface of genu straight, with long proximal swimming setae and numerous short pointed setae; in addition, swimming setae present in distolateral part of genu. Tibia IV (Fig. 391) curved, slightly thickened near middle, with concave dorsal and convex ventral sides; with 9–12 dorsal and 6–7 short ventrolateral setae, with 6–7 long swimming setae, and distolateral leaf-shaped seta (Figs 392–393). Tibia and tarsus IV approxi-



Figs. 386–388. *Tiphys pistillifer*, male: 386 — ventral view, 387 — genital plate, 388 — leg II. Scale bars: 386 = 100, 387–388 = 50.

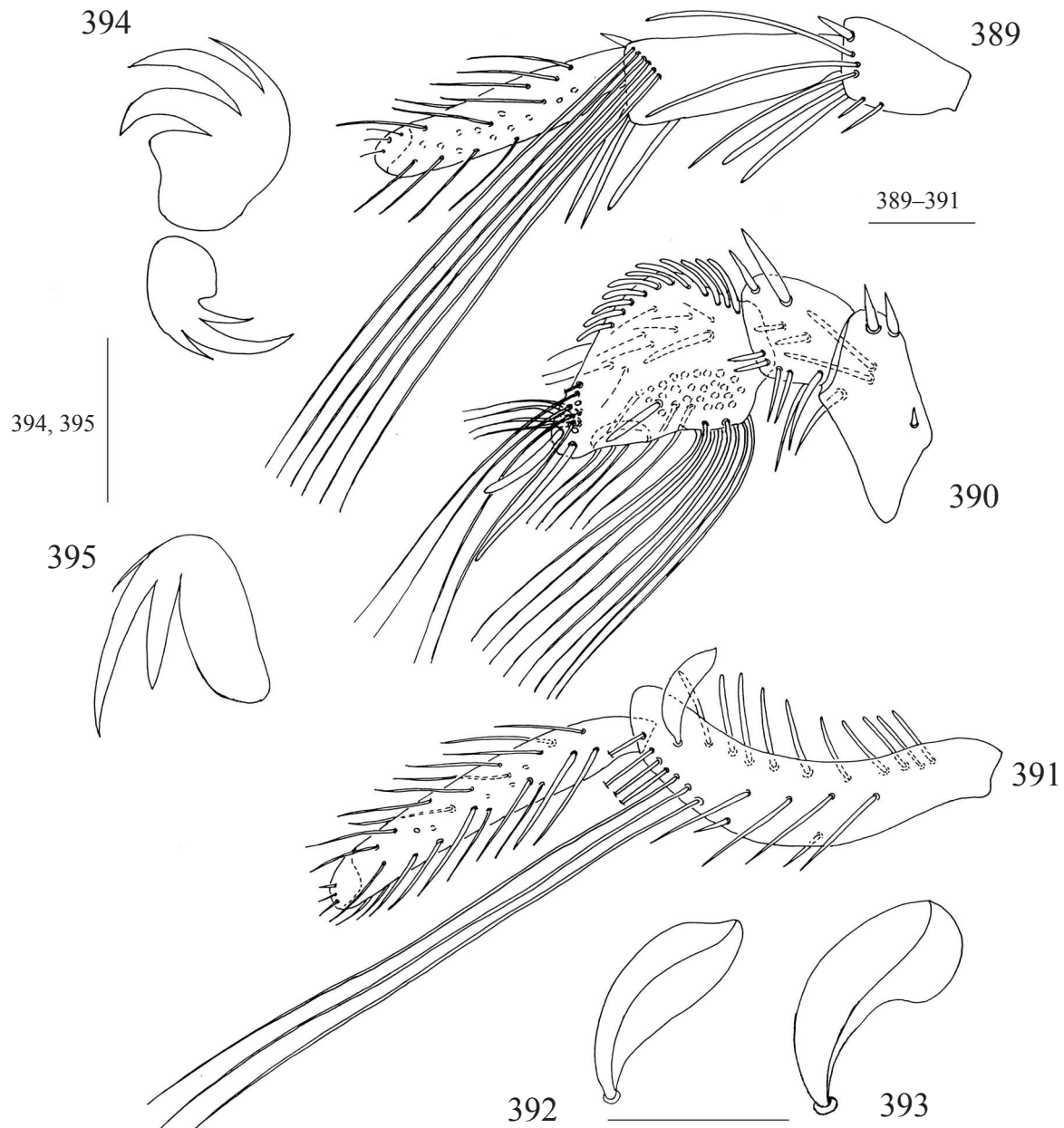
mately some length, latter with numerous thin and thick setae. Claw of legs I and II approximately equal in sizes, with wide internal and narrow external denticles. Claws of legs III (Fig. 394) asymmetric, with 3 unequal denticle each, large claw with rather long internal and median denticles and short external one; small claw with long median denticle and short internal and external denticles; all denticles pointed. Claws of legs IV with short internal and long external pointed denticles, latter supplied with short spur (Fig. 395).

Measurements, $n=5$. Body length 560–590; length of genital opening 64–70; length of genital plate 120–135, width 150–170; length (or diameter) of genital acetabula (*ac.* 1–3): 30–35, 25–30, 30–35; length of basal segment of chelicera 120–126; length of cheliceral stylet 54–60; length of pedipalpal segment (P-1–5) — 24–30, 84–90, 48–55, 90–96, 35–42; length of leg segments: I–Leg. 1–6 — 55–65, 60–66, 75–95, 120–130, 125–135, 160–175; II–Leg. 1–6 — 65–75, 65–73, 90–95, 120–130, 120–135, 170–185; III–Leg. 1–6 — 65–80, 60–66, 54–60, 70–80, 115–120, 130–140; IV–Leg. 1–6 — 125–140, 70–85, 54–75, 125–135, 195–205, 185–205; length of medial margin of coxae III 48–60, length of medial margin of coxae IV 110–125, length of leaf-shaped seta on tibia of legs II 50–55, its width 18–23.

Larva. Body small and oval in shape; dorsal shield truncate anteriorly, rounded posteriorly, it an-

teromedial margins are weakly concave (Fig. 396). Dorsal shield elongate (ratio length/width 1.4–1.6), covering almost all dorsum in unengorged larvae and bearing two pairs of trichobothria (*Fp*, *Oi*). Setae *Fch* situated in anterolateral corners of dorsal shield, and setae *Vi* occupying lateral position; both these pairs of setae in immature specimens separated from dorsal shield. Setae *Oe*, *Hi*, *He*, *Sci*, *Sce*, *Li* and the first 3 pairs of lyriform organs (*i1*–*i3*) are located on the soft wrinkled membrane. Lateral sides of coxae II+III coming onto dorsal side and almost extending to setae *Oi* and other hysterosomal setae located on interscutal membrane. Dorsal shield with a pore like structure and slightly developed reticulations on it.

Coxal plates I–II small; anterior coxal plates separated from coxal plates II and III which fused, suture line between them is developed only in their lateral parts (Fig. 397). Anterior margin of coxal plates I is straight or weakly concave and almost twice as short as posterior margin. Setae C1 shorter than setae C2–C4 which approximately equal in length. Base of setae C4 on coxal plate III located near medial end of suture line between coxal plates II and III. Posteromedial apodemes of coxal plates I developed distinctly, apodemes of coxal plates II and III slightly developed or reduced. Transverse muscle attachment scar located in the posteromedial angles of coxal plates III. Setae *Ci*, *Si*, *Se*, *Le*, *Pi*, *Pe* and two pairs of lyriform organs (*i4*–*i5*)



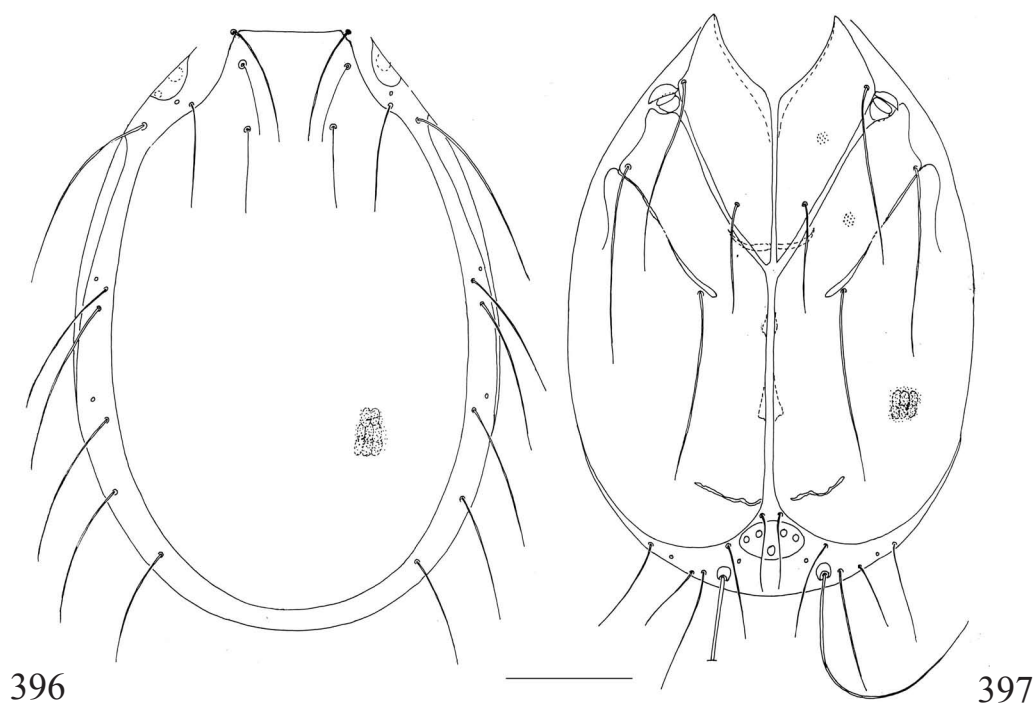
Figs 389–395. *Tiphys pistillifer*, male: 389 — genu, tibia and tarsus of leg III, 390 — basifemur, telofemur and genu of leg IV, 391 — tibia and tarsus of leg IV, 392–393 — leaf-shaped seta, 394 — claws of tarsus III, 395 — claw of tarsus IV. Scale bars: 389–393 = 50, 394–395 = 20.

situated on the soft interscutal membrane in the posterior part of the body. Setae *Ci* longest and thickest of all ventral idiosomal setae, and situated on small bases; setae *Se* shorter than *Si*. All lyri-form organs are ring-shaped. Coxal plates I–III with pore-like structure and slightly developed reticulations on it. Urstigma occupying lateral position on border between coxae I and II and provided with cups.

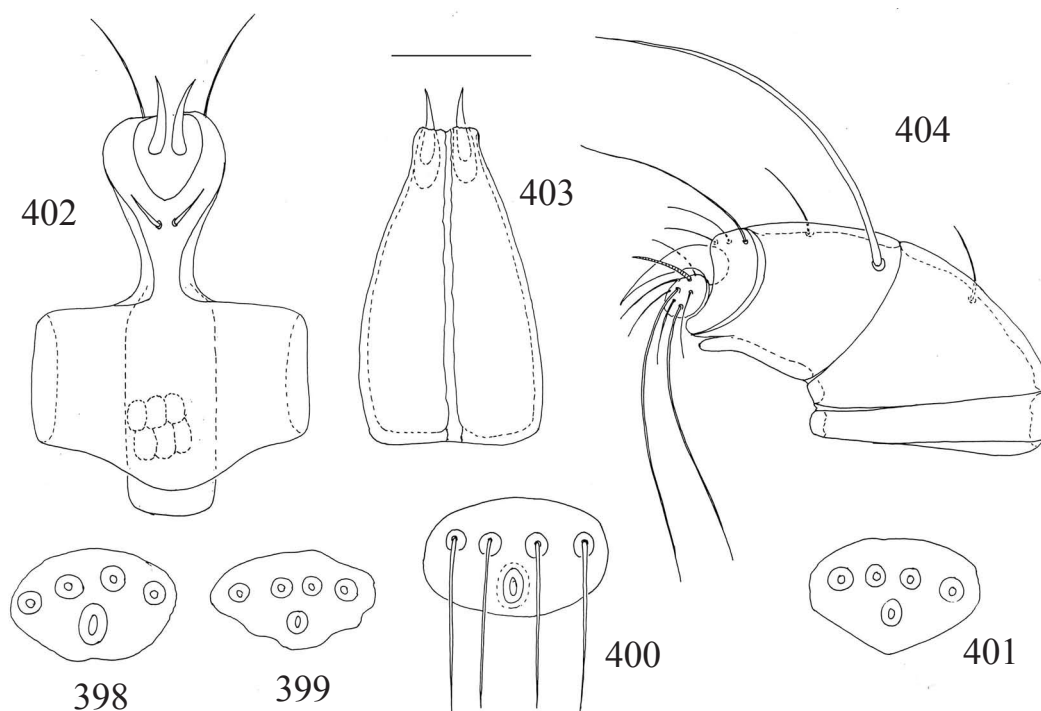
Excretory pore plate wider than long (Figs 398–401), ratio length/width = 0.6–0.7. Setae *Ai* and *Ae* approximately equal in sizes. Anal setae forming regular transverse row, or setae *Ai* located

slightly anterior to setae *Ae*; excretory pore located in posterior half excretory pore plate.

Capitulum with wide base, anterior hypostomal setae long, thin and posterior hypostomal setae short, spine-like (Fig. 402). Basal segments of chelicerae (Fig. 403) fused by their medial parts; suture line well developed along their whole length. Cheliceral stylet rather small and crescent. Pedipalp trochanter (Fig. 404) short and without setae; dorsal setae of femur and genu of pedipalps approximately equal in size, proximal lateral genual seta very long and very heavy; tibia with one long seta, two short setae, and large dorsodistal



Figs 396–397. *Tiphys pistillifer*, larva: 396 — dorsal view, 397 — ventral view. Scale bar: 396–397= 50.

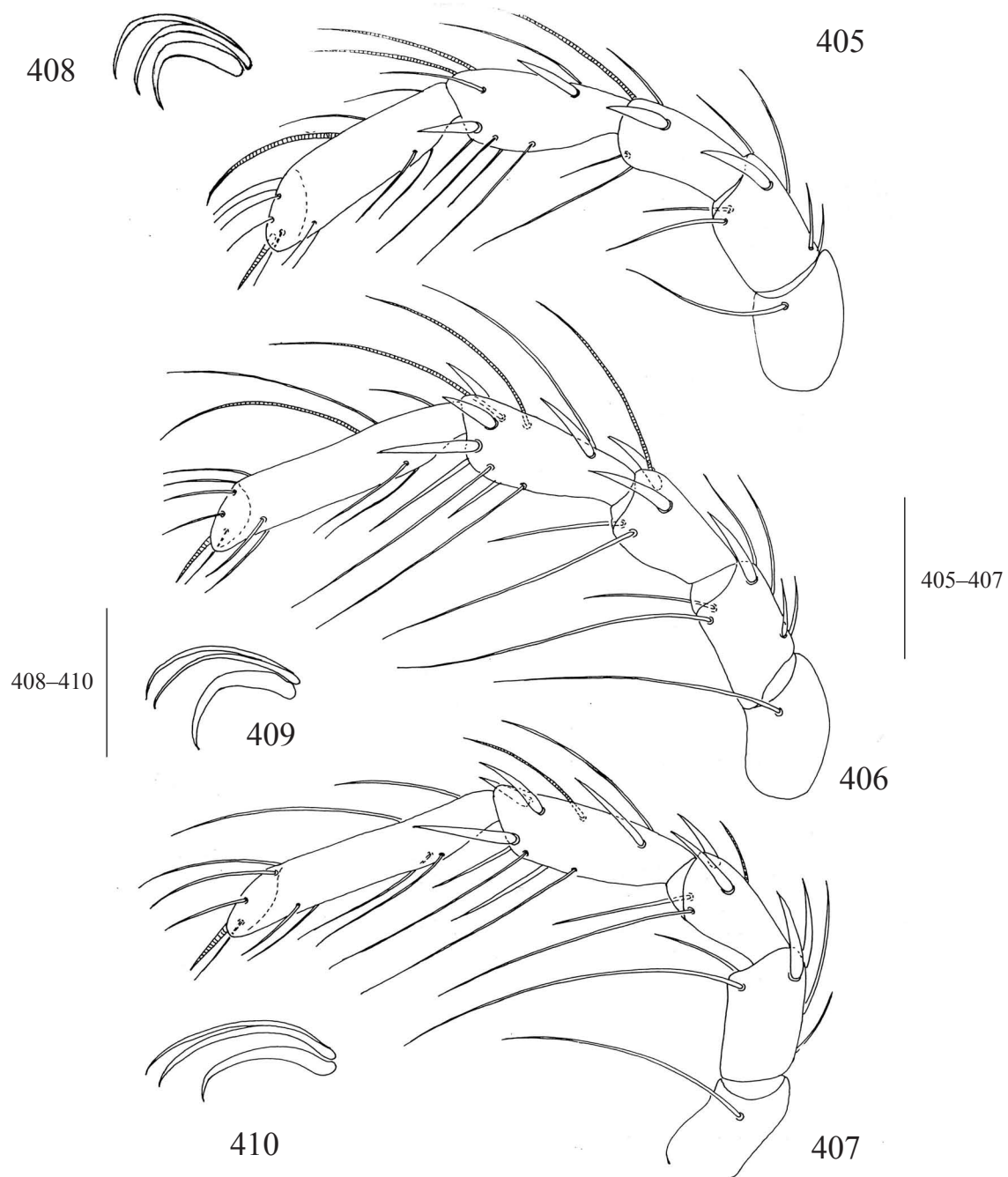


Figs 398–404. *Tiphys pistillifer*, larva: 398–401 — excretory pore plate, 402 — capitulum (ventral view), 403 — chelicerae, 404 — pedipalp. Scale bar: 398–404 = 20.

claw. Pedipalpal tarsus with 1 short solenidion, 2 long and 5 short thin setae.

All legs rather slender (Figs 405–407). The general number of setae on legs I–III, except eupathidia, is as follows: I–Leg. 1–5 — 1, 7, 5 (s), 11(2s), 13 (s, ac); II–Leg. 1–5 — 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg. 1–5 — 1, 6, 5(s), 10 (s),

11 (ac). Formula of large setae on leg segments as follows: I–Leg 1–5 — 0, 1, 1, 2, 0; II–Leg 1–5 — 0, 1, 2, 4, 0; III–Leg 1–6 — 0, 2, 2, 4, 0. Solenidion on genu of leg I longer than solenidia on tibia I; solenidia on genu and tibia of legs II equal in size; solenidion on genu of leg III shorter than solenidion on tibia III. On tarsi of legs I and II, empodium



Figs 405–410. *Tiphys pistillifer*, larva: 405 — leg I, 406 — leg II, 407 — leg III, 408 — claws of leg I, 409 — claws of leg II, 410 — claws of leg III. Scale bars: 405–407 = 40, 408–410 = 20.

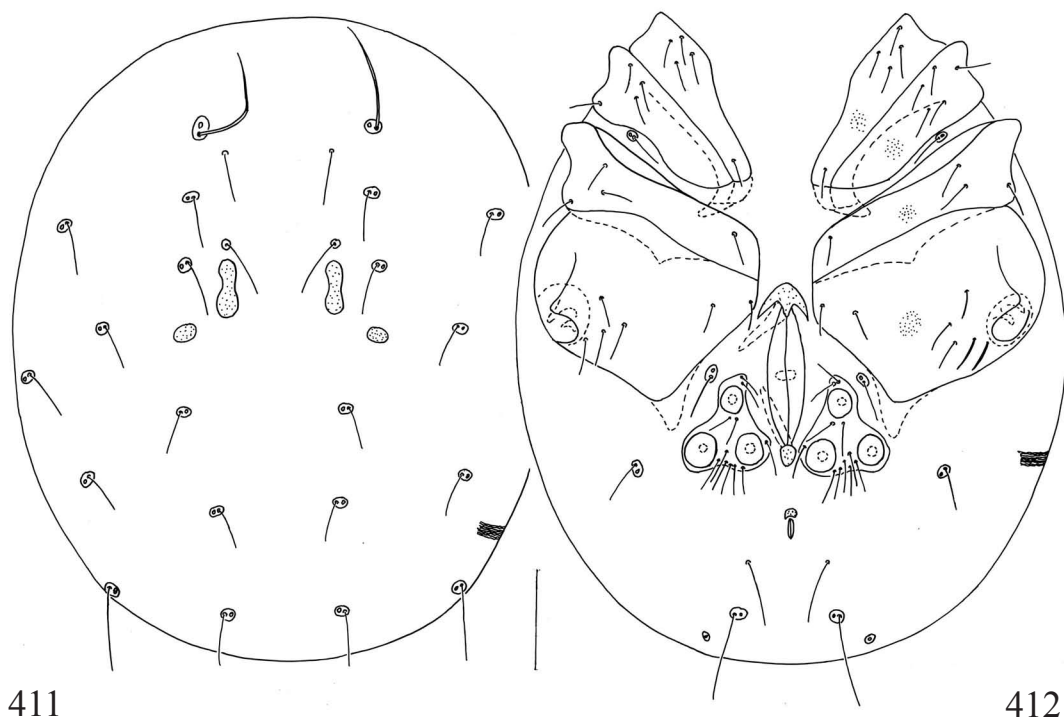
bent at a right angle, and ambulacra only slightly bent (Figs 408–409). Distal part of empodium of leg III turned onto ventral side at obtuse angle (Fig. 410).

Measurements, $n=10$. Length of dorsal shield 225–275, its width 155–175; diameter of urstigma 10–12; length of the anal plate 17–22, its width 32–35; length of capitulum 64–70; length of basal segment of chelicera 65–70, length of the chelicera stylet 13–19; length of medial margin of the coxae I 70–80, length of medial margin of coxae

II+III 105–115; length of pedipalpal segments (P-1–5): 5–10, 24–32, 18–22, 7–11, 5–7; length of legs segments: I-Leg. 1–5: 32–42, 28–32, 28–35, 40–48, 55–65; II-Leg. 1–5: 35–39, 32–36, 32–37, 44–55, 65–77; III-Leg. 1–5: 35–42, 35–42, 32–36, 50–58, 70–77.

Ecology. Temporary ponds, sedge bogs, lakes, brooks.

Geographical distribution. Europe (Viets 1956; Lundblad 1968; K.O. Viets 1978), Russia: Yaroslavl Province (Tuzovsky 1996, 2008).



Figs 411–412. *Tiphys gladiator*, female: 411—dorsal view, 412—ventral view. Scale bar: 411–412 = 100.

***Tiphys (Acercopsis) gladiator* Tuzovskij, 2005**

Figs 411–430

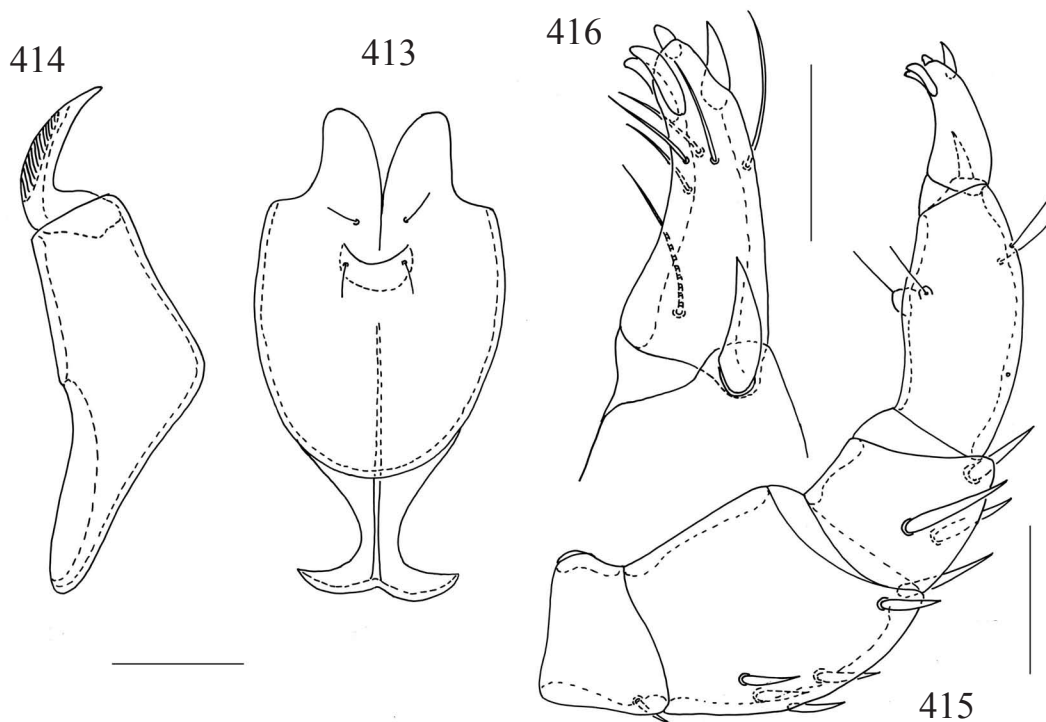
Material. Holotype male (IBIW 9102): Russia, Yaroslavl Province, Nekouz Distr., Borok; sedgesphagnum bog near the settlement, 22 August 1974, P.V. Tuzovsky. Paratype: 1 female, same location as the holotype, 28. August 1974, P.V. Tuzovsky.

Diagnosis. Female. Dorsum with two pairs of anterior sclerites. Genital plates triangular with 3 acetabula and 11 thin short setae. Acetabula rather large and equal in sizes, genital opening approximately 1.5 times as long as genital plates. Pedipalpal genu with 3 setae, base of external lateral seta situated proximally to middle of segment; tibia moderately in length with relatively short with distolateral spine (2.5 times as short as tarsus), both ventral setae situated near middle of segment.

Male. Medial margin of coxae III in 1.5–2.0 times shorter than medial margin of coxae IV. Genital plates fused by anterior and posterior ends, acetabula arranged in an arc. Genital setae clustered in four groups; two anterior groups have a few setae (8–10) and located as two rows in the anterior part of plate, two posterior groups with very numerous setae. All sclerites, bearing ventral idiosomal setae, situated on soft cuticle. Tibia II with one rather long ventrodistal sword-like seta and small clavate one. Genu IV expanded dors-

oventrally with maximal height in middle of segment, bearing 10 short and bent setae with round tips; ventral surface of genu nearly straight, with long proximal swimming setae and numerous short pointed setae. Tibia IV slightly thickened near middle, with distolateral fan-shaped seta and considerably shorter than tarsus IV. Pedipalps similar to female, but tibia with more numerous dorsal setae.

Description. Female. Body oval; setae *Fch* long, whip-like, other idiosomal setae filiform (Fig. 411). Integument soft, with very fine strips. Dorsum with rather large anteromedial and relatively small anterolateral plates. Medial plates elongate, lateral plates transverse. Anterior and posterior groups of coxae with rather large apodemes (Fig. 412). Medial edge of coxal plates III and IV approximately equal in length, lateral edges of coxal plate IV twice as long as lateral edges of coxal plates III. Suture line between coxal plates III and IV obliquely posteromedially-directed. Posteromedial margin of coxal plate IV oblique, weakly concave or straight. Surface of all coxae with fine pores. Sclerites, bearing all ventral idiosomal setae, situated freely on soft cuticle. Genital plate triangular with 3 acetabula and 11 thin short setae. Lateral margins of genital plates distinctly concave, their internal and posterior margins weakly concave. Acetabula rather large, separated by wide space. Genital opening 1.5 times longer



Figs 413–416. *Tiphys gladiator*, female: 413 — capitulum, ventral view, 414 — chelicera, 415 — pedipalp, 416 — distal part of pedipalpal tibia and tarsus. Scale bars: 413–414 = 50, 415 = 45, 416 = 20.

than genital plates. Excretory pore with small anterior sclerite.

Capitulum elongate, with large anchoral projection, both pairs of hypostomal setae subequal (Fig. 413). Basal segment of chelicera (Fig. 414) with large dorsal obtuse hump. Cheliceral stylet moderate in size, without ventral teeth.

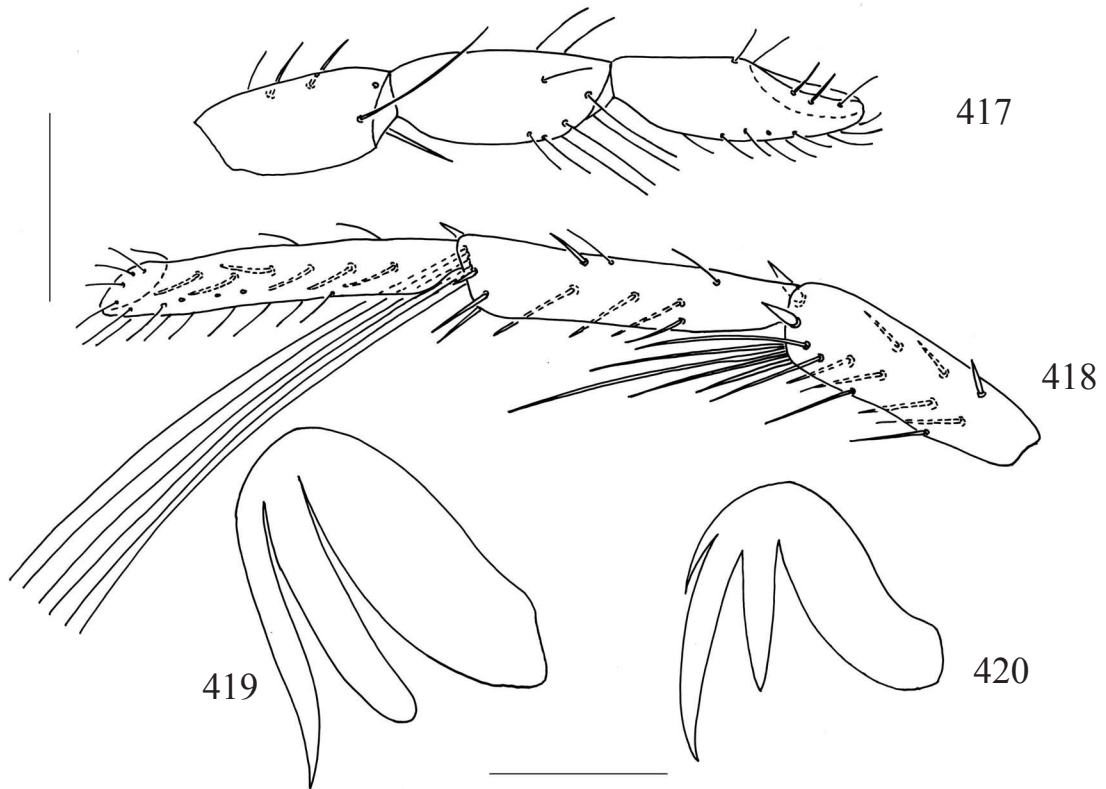
Pedipalp (Fig. 415) rather short. Trochanter of pedipalp with one dorsodistal seta. Ventral margin of femur and genu of pedipalp straight. Femur with 3–4 proximal and 2 dorsodistal setae. Genu with 3 setae, external lateral seta longer than two other setae; base of external lateral seta situated proximally to middle of segment. Pedipalpal tibia relatively short, with relatively large distolateral spine (2.5 times shorter than tarsus), 2 ventral and 2–3 dorsal setae; internal ventral seta on tibia inserted on relatively large conic tubercle, base of external ventral seta on small tubercle. Tarsus (Fig. 416) with proximal solenidion, with 5 thin setae and 4 thick unequal dorsodistalsetae.

Two anterior pairs of legs without swimming setae (Fig. 417). Two relatively short swimming setae present on genu III, 3 on genu IV, 4 long swimming setae on tibia III and 5–6 on tibia IV (Fig. 418). Claws of legs I–III larger than claws IV. Internal denticle of claw of legs I–III wide with roundish tip, external denticle thin and pointed (Fig. 419). Claws IV with short internal and long

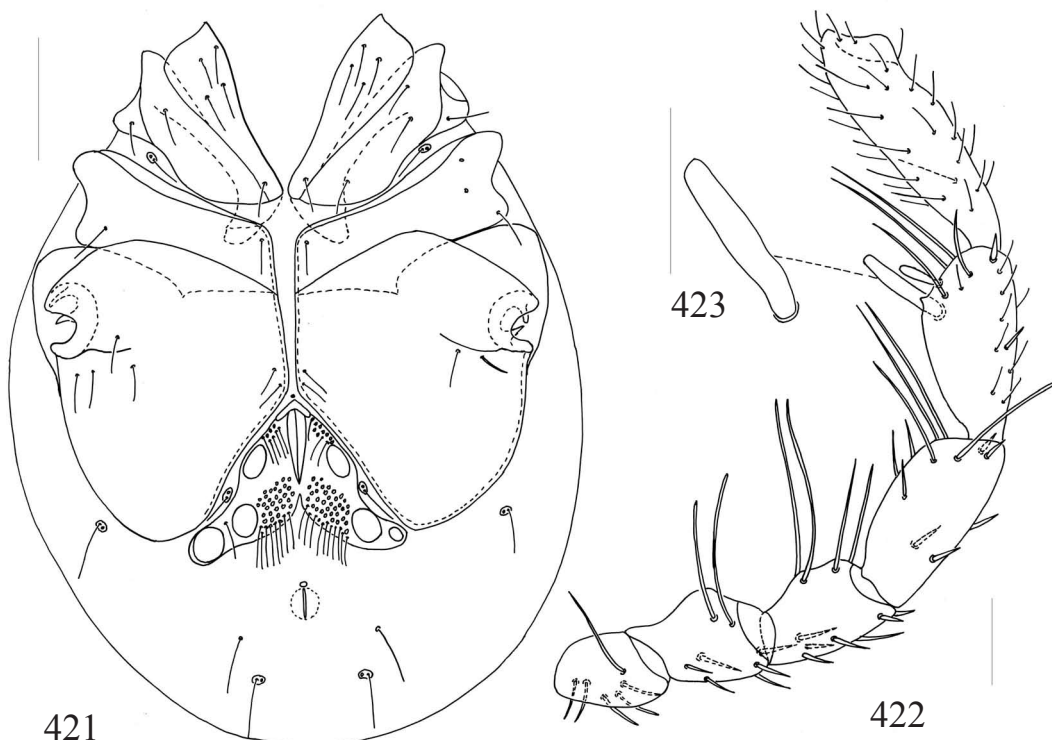
external denticles, latter with short spur (Fig. 420).

Measurements (n=1). Body length 610; length of medial margin of coxa III 30–36, length of medial margin of coxa IV 36–42; length of genital plates 90, its width 77; length of genital acetabula (ac. 1–3): 25, 30, 30; length of capitulum with anchoral projection 185; length of basal segment of chelicera 125; length of cheliceral stylet 55; length of pedipalpal segment (P-1–5): 33, 90, 57, 90, 45; length of leg segments: I–Leg. 1–6: 55, 80, 80, 105, 125, 140; II–Leg. 1–6: 55, 85, 80, 105, 130, 155; III–Leg. 1–6: 75, 80, 75, 105, 145, 145; IV–Leg. 1–6: 105, 80, 105, 165, 185, 205.

Male. Dorsal surface, coxa of legs I–II (Fig. 421) similar to female. Anterior apodemes rather large, extending posteriorly to beneath medial edge of coxal plate III; posterior apodemes not developed. Coxae IV greatly expanded, their length exceeding total length of coxae I–III. Medial margin of coxae III in 1.6 times shorter than length of medial margin of coxae IV; lateral edge of coxa IV 3 times longer than length of lateral edge of coxa III. Posteromedial margin of coxae IV oblique and forming bay where external genital field situated; lateral edge of these coxae convex. Genital plates fused by anterior and posterior ends, acetabula arranged in arc. Anterior and posterior acetabula oval, median acetabula rounded. Distance between



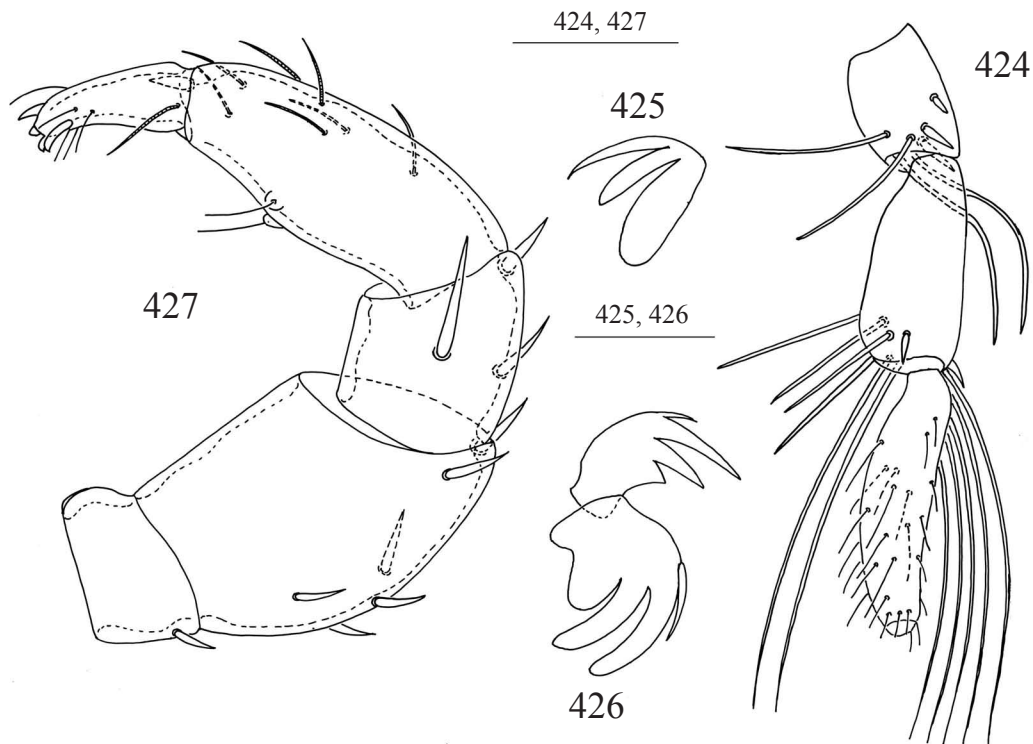
Figs 417–420. *Tiphys gladiator*, female: 417 — genu, tibia and tarsus of leg I, 418 — genu, tibia and tarsus of leg IV, 419 — claw of leg II, 420 — claw of leg IV. Scale bars: 417–418 = 100, 419–420 = 20.



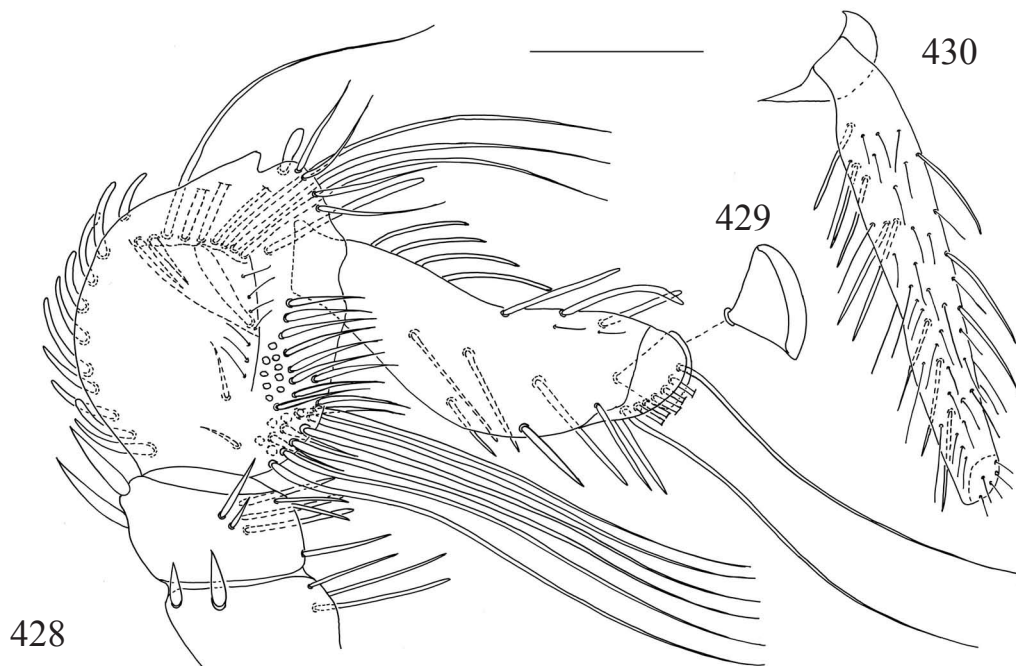
Figs. 421–423. *Tiphys gladiator*, male: 421 — ventral view, 422 — leg II, 423 — sword-shaped seta. Scale bars: 421, 423 = 100, 422 = 50.

first and second acetabula twice longer than than distance between median and third acetabula. Lateral edges of genital plate weakly concave; poste-

rior margins converge under blunt angle and form median incision. Genital setae clustered in four groups; two anterior groups have few setae (8–10)



Figs 424–427. *Tiphys gladiator*, male: 424 — genu, tibia and tarsus of leg III, 425 — claw of tarsus II, 426 — claw of tarsus III, 427 — pedipalp. Scale bars: 424, 427 = 50; 425–426 = 20.



Figs 428–430. *Tiphys gladiator*, male: 428 — basifemur, telofemur, genu and of leg IV, 429 — fan-shaped seta, 430 — tarsus of leg III. Scale bar: 428–430 = 80.

and located as two rows in anterior part of plate, two posterior groups with very numerous setae. All sclerites, bearing ventral idiosomal setae, situated on soft cuticle. Excretory pore with tiny anterior sclerite.

Basifemur II (Fig. 422), with ventral hump, tibia II with ventrodistal sword-like seta and small

clavate one. Lateral margins of sword-shaped seta (Fig. 423), parallel to each other and not expanded distally. Genu III (Fig. 424) with 2, tibia III with 6–7 long swimming setae. Genu IV (Fig. 428) expanded dorsoventrally, with convex dorsal surface bearing 10 short, bent setae with round tips. Ventral surface of genu nearly straight, with long

proximal swimming setae and numerous short pointed ventral setae. In addition, swimming setae present in distolateral part of genu; distal edge of genu with small notch and short clavate seta. Tibia IV (Fig. 398) slightly thickened near middle, with concave dorsal and convex ventral sides; with 7 dorsal, 7 short ventrolateral setae, 6–7 long swimming setae, and distolateral fan-shaped seta (Fig. 429). Tarsus IV (Fig. 430) with numerous thin and thick setae. Claw of legs I and II approximately equal in length, with wide internal denticle and narrow external one (Fig. 425). Claws of legs III (Fig. 426) asymmetric with 3 unequal denticle each, large claw with rather long internal and median denticles with rounded tips and short pointed external denticle; small claw with 3 unequal pointed denticles.

Pedipalps similar to those in female, but tibia with more numerous dorsal setae (Fig. 427).

Measurements (n=1). Body length 660; length of seta Fch 130; length of genital opening 70; length of genital plate 145, width 195; length (or diameter) of genital acetabula (ac. 1–3): 38, 32, 32; length of capitulum with anchoral projection 185; length of basal segment of chelicera 115; length of cheliceral stylet 50; length of pedipalpal segment (P-1–5): 33, 90, 57, 95, 45; length of leg segments: I–Leg. 1–6: 55, 85, 90, 120, 145, 170; II–Leg. 1–6: 65, 90, 90, 120, 135, 185; III–Leg. 1–6: 75, 90, 65, 75, 120, 155; IV–Leg. 1–6: 130, 105, 75, 155, 190, 240; length of medial margin of coxae III 55, length of medial margin of coxae IV 90, length of sword-shaped seta on tibia of legs II 120, width 24; length of fan-shaped seta on tibia of legs IV 32, width 52–55.

Ecology. Sedge-sphagnum bog.

Geographical distribution. Europe, Russia: Yaroslavl Province (Tuzovsky 2005).

Keys to species of the genus *Tiphys*

Females

- 1 (6) Pedipalpal tibia without ventral tubercles
- 2 (3) Ventral setae on pedipalpal tibia located near middle of segment (Fig. 146) *T. lapponicus* (Neuman, 1880)
- 3 (2) Ventral setae on pedipalpal tibia located distally
- 4 (5) Pedipalpal genu with 3 setae (Fig. 348) *T. ensifer* (Koenike, 1895)
- 5 (4) Pedipalpal genu with 2 setae (Fig. 340) *T. chaunensis* sp. n.
- 6 (1) Pedipalpal tibia with more or less developed ventral tubercles

- 7 (8) Claws of all legs equal in size *T. samaraensis* sp. n.
- 8 (7) Claws of legs I–III considerably larger than claws of legs IV
- 9 (10) Suture line between coxal plates III and IV incomplete, obliterated medially (Fig. 222) *T. kolymaensis* sp. n.
- 10 (9) Suture line between coxal plates III and IV complete
- 11 (16) Genital plates crescent- or half-moon shaped
- 12 (13) Posteromedial angle of coxal plate IV well developed, acute (Fig. 20) *T. ornatus* Koch, 1836
- 13 (12) Posteromedial angle of coxal plate IV moderately developed, right or obtuse
- 14 (15) Anterior genital sclerite large (Fig. 102), pedipalps slender (Fig. 109), setae *Fch* relatively short (Fig. 99) *T. scaurellus* Tuzovskij, 1983
- 15 (14) Anterior genital sclerite small (Fig. 208), pedipalps stocky (Fig. 211), setae *Fch* long (Fig. 205) *T. kamchatkaensis* sp. n.
- 16 (11) Genital plates triangular
- 17 (20) Two (rarely three) genital setae located in the soft integument between anterior genital sclerite and genital plate on each side
- 18 (19) Ventral tubercles on pedipalpal tibia slightly developed, peg-like seta on tibia lesser than 0.25 of tarsus length *T. bullatus* (Thor, 1899)
- 19 (18) Ventral tubercles on pedipalpal tibia well developed, peg-like seta on tibia 0.4–0.5 of tarsus length (Fig. 256) *T. torris* Koenike, 1914
- 20 (17) All genital setae located on genital plates
- 21 (22) Genital acetabula very small, distance between second and third acetabula approximately equal to two diameters of any acetabulum (Fig. 303) *T. minutiporus* sp. n.
- 22 (21) Genital acetabula relatively large, distance between second and third acetabula smaller than diameter of any acetabulum
- 23 (26) Medial margin of coxal plates IV longer than medial margin of coxal plates III
- 24 (25) Lateral setae on pedipalpal genu located proximally to middle of segment (Fig. 182); leg claw blade moderately developed, with nearly straight ventral margin, internal clawlet considerably wider than external one (Fig. 184) *T. latipes* (Müller, 1776)
- 25 (24) Lateral setae on pedipalpal genu located distally to middle of segment (Fig. 72); leg claw blade well developed, with convex ventral margin, internal and external clawlets approximately equal in wide (Fig. 74) *T. scaurus* (Koenike, 1892)

- 26 (23) Medial margin of coxal plates III and IV equal in length
 27 (28) Dorsum with 3 pairs of platelets (Fig. 374), venter with 4 pairs of lateral platelets (Fig. 375), genital plates with 7–8 setae each (Figs 376–377) *T. pistillifer* (Koenike, 1908)
 28 (27) Dorsum with 2 pairs of platelets (Fig. 411), venter without lateral platelets (Fig. 412), genital plates with 11 setae each *T. gladiator* Tuzovskij, 2003

Males

- 1 (4) Basifemur II with ventral hump, tibia II with distal spatulate seta or sword-like seta (subgenus *Aceropsis*)
 2 (3) Tibia II with spatulate seta (Fig. 388), genu of leg IV (Fig. 390) expanded dorsoventrally with ventroproximal protrusion, tibia IV with distolateral leaf-shaped seta *T. pistillifer* (Koenike, 1908)
 3 (2) Tibia of leg II with sword-like seta (Fig. 422), genu of leg IV (Fig. 428) expanded dorsoventrally with maximum height near middle of segment, tibia IV with a distal fan-shaped seta *T. gladiator* Tuzovskij, 2003
 4 (1) Basifemur II without ventral hump, tibia of leg II without spatulate seta or sword-like
 5 (8) Genu IV with large dorsodistal curved sword like seta (subgenus *Pionides*)
 6 (7) Sword like seta reaching to the middle of genu IV (Fig. 353) *T. ensifer* (Koenike, 1895)
 7 (6) Sword like seta almost as long as genu IV (Fig. 373) *T. uchidai* Viets, 1956
 8 (5) Genu IV without dorsodistal curved sword like seta (subgenus *Tiphys*)
 9 (10) Anterior coxal groups fused to each other medially (Fig. 56) *T. anadyrensis* sp. n.
 10 (9) Anterior coxal groups separated
 11 (18) Posteromedial portions of coxal plates IV forming a rather deep genital bay embracing genital plates completely or partially
 12 (15) Genital plates nearly completely situated in genital bay, claws of leg III with 2 clawlets
 13 (14) Posterior coxal group separated (Fig. 30), genital bay wide anteriorly, genu IV elongate with maximum thickness near middle of segment (Fig. 32), tibia of leg III not expanded distally (Fig. 31) *T. ornatus* Koch, 1836
 14 (13) Posterior coxal groups close to each other (Fig. 112), genital bay narrow anteriorly, genu IV expanded distally (Fig. 115), tibia III expanded distally (Fig. 114) *T. scaurellus* Tuzovskij, 1983

- 15.(12) Genital plates only partially placed in genital bay, claws of leg III with 3 clawlets
 16 (17) Base of external lateral seta on pedipalpal genu situated distally to middle of segment, external seta on pedipalpal tibia placed on large tubercle, distolateral spine of this tibia 2.0–2.5 times shorter than tarsus (Fig. 256); genu IV greatly expanded dorsoventrally with distinct ventroproximal corner (Fig. 261) *T. torris* Koenike, 1914
 17 (16) Base of external lateral seta on pedipalpal genu situated in middle of segment, external seta on pedipalpal tibia placed on small tubercle, length of distolateral spine of tibia approximately 4 times shorter than tarsus; genu IV weakly expanded dorsoventrally without ventroproximal corner *T. bullatus* (Thor, 1899)
 18 (11) Posteromedial portions of coxal plates IV not forming deep genital bay, genital plates placed posterior to coxae IV
 19 (20) Genu IV not expanded dorsoventrally in relation to telofemur IV (Fig. 297) *T. yaroslavlensis* sp. n.
 20 (19) Genu of leg IV well expanded dorsoventrally in relation to telofemur IV
 21 (22) Tarsus IV considerably longer than tibia IV (Fig. 153) *T. lapponicus* (Neuman, 1880)
 22 (21) Tarsus and tibia IV approximately equal in length
 23 (26) Genu IV greatly expanded dorsoventrally, with large ventral hump near middle of segment
 24 (25) Setae *Hv* and *Pe* fused with posterior margins of coxal plates II and IV, respectively (Fig. 185); tibia IV with short peg-like seta (Fig. 187); tarsus IV with 6 short and thick unequal setae; small leg claw III with 2 subequal denticles (Fig. 188) *T. latipes* (Müller, 1776)
 25 (24) Setae *Hv* and *Pe* free, located on soft integument (Fig. 214); tibia IV with rather long lance-shaped seta (Fig. 217); tarsus IV with 4 short and thick subequal setae; small leg claw III with 2 unequal denticles (Fig. 218) *T. kamchatkaensis* sp. n.
 26 (23) Genu IV slightly expanded dorsoventrally, without ventral hump, with weakly convex dorsal and ventral margins (Fig. 77) *T. scaurus* (Koenike, 1892)

Deutonymphs

- 1 (2) Claws of all legs equal in size *T. ensifer* (Koenike, 1895)
 2 (1) Claws of leg I–III considerably larger than claws of legs IV
 3 (10) Dorsal plates present
 4 (9) Excretory pore with more or less developed

anterior sclerite, ventral setae on pedipalpal tibia short, located distally to middle of segment

5 (6) Pedipalpal tibia with long distal peg-like seta, about 0.65 of tarsus length (Fig. 266) *T. torris* Koenike, 1914

6 (5) Pedipalpal tibia with short distal peg-like seta, lesser than 0.50 of tarsus length

7 (8) Lateral seta on pedipalpal genu located near middle of segment, distal peg-like setae on tibia short, about 0.3 of tarsus length (Fig. 121), tibia IV with 5 swimming setae (Fig. 122) *T. scaurellus* Tuzovskij, 1983

8 (7) Lateral seta on pedipalpal genu located near distal end of segment, distal peg-like setae on tibia of moderate length, about 0.5 of tarsus length (Fig. 82), tibia IV with 6 swimming setae (Fig. 84) *T. scaurus* (Koenike, 1892)

9 (4) Excretory pore without anterior sclerite, ventral setae on pedipalpal tibia long, located near middle of segment (Fig. 158) *T. lapponicus* (Neuman, 1880)

10 (3) True dorsal plates absent

11 (12) Lateral seta on pedipalpal genu located proximally to middle of segment (Fig. 190), both ventral setae of pedipalpal tibia placed distally, distance between genital acetabula longer than diameter of acetabulum (Fig. 189) *T. latipes* (Müller, 1776)

12 (11) Lateral seta on pedipalpal genu located distally to middle of segment (Fig. 37), both ventral setae of pedipalpal tibia placed near middle of segment, distance between genital acetabula shorter than diameter acetabulum (Fig. 35) *T. ornatus* Koch, 1836

Larvae

1 (14) Transverse muscle attachment scar on coxal plate III present on each side

2 (7) Dorsal and ventral shields punctate

3 (4) Solenidion on genu II and both solenidia on tibia II (Fig. 369) subequal in length *T. ensifer* (Koenike, 1895)

4 (3) Solenidion on genu of leg II shorter than both solenidia on tibia II

5 (6) Proximal solenidion on tibia II shorter than distal one (Fig. 201), solenidion on genu I slightly longer than both solenidia on tibia I (Fig. 200) *T. latipes* (Müller, 1776)

6 (5) Both solenidia on tibia of leg II equal in length (Fig. 242), solenidion on genu I and both solenidia on tibia I (Fig. 241) approximately equal in length *T. kolymaensis* sp. n.

7 (2) Dorsal and ventral shields with reticulation

8 (9) Dorsal shield well elongate (Fig. 268), ratio length/width = 1.70–1.85, with nearly straight lateral margins *T. torris* Koenike, 1914

9 (8) Dorsal shield relatively wide, ratio length/width < 1.5, with convex lateral margins

10 (11) Setae C1 and C2 on coxal plate I approximately equal in length (Fig. 311) *T. minutiporus* sp. n.

11 (10) Seta C1 on coxal plate I considerably shorter than C2

12 (13) Excretory pore plate with setae *Ai* and *Ae* subequal in length (Fig. 400), proximal and distal solenidia on tibia II equal in length (Fig. 406) *T. pistillifer* (Koenike, 1908)

13 (12) Excretory pore plate with short setae *Ai* and long setae *Ae* (Fig. 43), proximal solenidion on tibia II shorter than distal one (Fig. 50) *T. ornatus* Koch, 1836

14 (1) Transverse muscle attachment scar on coxal plate III absent

15 (16) Excretory pore plate wider than long (Fig. 320–323) *T. chaunensis* sp. n.

16 (15) Excretory pore plate as long as wide or longer than wide

17 (18) Dorsal shield nearly circular (Fig. 124), ratio length/width = 1.15–1.20 *T. scaurellus* Tuzovskij, 1983

18 (17) Dorsal shield elongate, ratio length/width = 1.4–1.6

19 (20) Capitular base wider than long (Fig. 164), base of seta C4 and medial portion of suture line between coxal plates II–III well separated from each other on each side (Fig. 161) *T. lapponicus* (Neuman, 1880)

20 (19) Capitular base longer than wide (Fig. 91), base of seta C4 and medial portion of suture line between coxal plates II–III close to each other (Fig. 85) *T. scaurus* (Koenike, 1892)

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