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Studies on four species of *Tenthredo* LINNAEUS from Burma and the Indian subcontinent (Insecta: Hymenoptera: Tenthredinidae: Tenthredininae)

With 21 Figures

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Abstract. Taxonomic studies on four species of *Tenthredo* LINNAEUS are carried out. Of these two species viz. *T. quadratus* and *T. maw* are added as new to science from the Indian subcontinent. These species are described and illustrated, and are compared with their allied ones viz. *T. spinifera* (FORSIUS) and *T. kashmirica* MALAISE, which are redescribed and illustrated on a uniform systematic pattern.

Introduction

In a series works concerning the revision of Tenthredinidae, two new species are described from different parts of India. To facilitate their identification with more authenticity, they are compared with their species *viz. T. spinifera* (FORSIUS) and *T. kashmirica* MALAISE, which are redescribed on a uniform pattern. To this date, with about 140 valid species already on record, the genus *Tenthredo* LINNAEUS is the largest sawfly genus in India. The taxonomic work on Indian *Tenthredo* LINN. was quite scattered, until MALAISE (1945) compiled almost all the works from Southeast Asia. Following this work after a silence of more than three decade, MUCHE (1982, 1983), SINGH (1985), SINGH et al. (1985), and SINGH & SAINI (1987a–c, 1988a–d, 1994) added numerous new species.

Among the members of subfamily Tenthredininae, species belonging to *Tenthredo* LINNAEUS are characterised by a combination of characters which follows: forewing with straight crossvein in the anal cell, hindwing with closed Rs and M cells, clypeus emarginate, and propodeum with midlongitudinal furrow dividing it into equal parts.

The present text deals with the detailed description of four species on a uniform pattern suggested by Dr D. R. SMITH of USNM, Washington. Terminology used by ROSS (1937, 1945) and MALAISE (1945) has been followed. The type materials of new species are housed at Pusa National Collections, Division of Entomology, Indian Agricultural Research Institute, New Delhi, India.

Abbreviations used in text are: EL = eye length, IATS = inner apical spur, ICD = inter cenchri distance, IDMO = interocular distance at level of median ocellus, ITD = intertegular distance, LID = lower interocular distance, MB = metabasitarsus, OATS = outer apical tibial spur, OCL = oculo-occipital line OOL = oculoocellar line, POL = postocellar line.

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Tenthredo spinifera (FORSIUS) (Figs. 1, 3, 5, 8, 13)

Tenthredella spinifera FORSIUS, 1931: 43.
Tenthredo spinifera: MALAISE, 1945: 242, SINGH & SAINI, 1986: 42.

Female. – Colour: Body sordid yellow to pale green, black are: antenna except underside of segments 5–9, mandible apex; frontal spot (Fig. 8) anteriorly covering median fovea except tip of supraantennal tubercles and spot anterior to median ocellus, laterally extending and touching upper $^1/_3$ of eye margin and posteriorly reaching hypothetical hind margin of head; a stripe along posterior eye margin is continuous with frontal spot; medial transverse stripe without reaching lateral margin, on pronotum; mesonotum except lateral margins of middle lobe and two spots on lateral lobe, narrow hind margins of meso- and metascutelli, visible parts of mesopostnotum, metanotum and metapostnotum except medial spot; underside of abdomen except narrow hind margin of propodeum and tergite 9 entirely; posterior stripe each on pro- and mesofemora, apical $^1/_2$ of metafemur, all tibiae and tarsi. Wings clear, costa and stigma pale green, venation brown to black.
Structure: Length 10 mm. Antenna filiform, 1.9× head width, flagellum not compressed, scape and pedicel as 4 : 3, segments 3 and 4 as 4 : 3. Clypeus (Fig. 1) arcuately incised upto $^1/_5$ of its length, labrum (Fig. 1) broader than long as 4 : 3 with roundly pointed anterior margins; malar space 1.8× diameter of median ocellus. LID : IDMO : EL = 1 : 1.4 : 1.2, POL : OCL : OOL = 1 : 2.5 : 2.5. Frontal area below level of eyes, median fovea shallowly canaliculate, and laterally limited by slightly raised supraantennal tubercles confluenting with similar frontal ridges; post-, inter- and circumocellar furrows faintly indicated; lateral furrows shallow, slightly excurved (bulging), postocellar area flat, longer than broad as 4 : 3, head narrowing behind eyes. ICD : ITD = 1 : 3; mesoscutellum (Fig. 5) pyramidal with thorn-like tip, its appendage carinate; mesepisternum obtusely round with compressed apex, mesosternum with short thorns. Metabasitarsus shorter than following 3 joints combined as 5 : 6; metafemur shorter than metatibia; tarsal claw (Fig. 3) with subapical tooth longer than apical one; IATS : MB : OATS = 1 : 1.8 : 0.9. Lancet (Fig. 13) with 21 serrulae.
Sculpture: Head with dense, minute, shallow punctation. Mesonotum and anterior slope of mesoscutellum puntate like head and with faint microsculpture, posterior slope of mesoscutellum with large, isolated, shallow punctation, its appendage faintly microstriated; mesepisternum and mesosternum distinctly microsculpture with sebaceous lustre. Abdomen microstriated with scattered punctation.
Pubescence: Golden, 0.15× scape length.

Male. – Not examined.

Material depository. – Holotype: untraceable. Paratype: IM (ZSI), Calcutta.

Material examined. – Specimen (got from NR, Stockholm) appended with labels as: Female, *Tenthredo spinifera* (FORSIUS), N.E. Burma, Kambaiti, 7000 ft., 11.6, det. R. Malaise.

Individual variations. – Single speciemen examined.

Distribution. – Burma, India: Sikkim

Discussion. – Though recorded from India (Sikkim is now part of India) this species is not represented in our cellections. Either it has gone extinct or we could not visit its actual collection locality. Sikkim is a very vast area and almost entire state is suitable for sawflies. So until and unless exact collection locality is not known it becomes difficult to collect the insect. Collection localities mentioned by KONOW, CAMERON and MALAISE are very vague (India, Sikkim, Assam, Kumaun Hills, Jammu & Kashmir) and generally it is very difficult to locate the exact collection localities of type. This is the reason that many old species are not represented in our collection. Under such circumstances one has to depend upon museums which are generally not ready to part with the valuable type material because there is every chance of its damage during transit.
On the basis of postocellar area narrowing anteriorly and distinctly longer than broad in female but subquadrate in male and mesoscutellum pyramidally raised, *T. spinifera* is somewhat related to *T quadratus* spec. nov. but both can be distinguished as in the latter tarsal claw is with subapical tooth shorter

than apical one, malar space 0.5 × diameter of median ocellus, black frontal spot missing and the postocellar area alomost as long as broad, whereas in *T. spinifera* tarsal claw is with subapical tooth longer than apical one, malar space 1.8 × diameter of median ocellus, black frontal spot present, and the postocellar area longer than broad as 4 : 3. Overall colour pattern is also very different in both the species.

Tenthredo quadratus spec. nov. (Figs. 2, 4, 6, 16, 19)

Female. – Yet to be reported.

Male. – Colour: Body sordid yellow, black are: antenna except underside of segments 3–9, head except labrum and hind orbit; median transverse stripe of pronotum; seams and lateral stripe on lateral lobes of mesonotum; visible parts of metanotum, anterior margin of propodeum, anterior stripe on subtriangular medial spot on tergite 2, anteromedial stripes on tergites 3–8; posterior stripe on all legs except coxae. Wings hayline, costa and stigma pale green, rest of venation fuscous to black.
Structure: Length 8 mm. Antenna filiform, 2.5 × head with, flagellum not compressed; scape and pedicel as 5 : 3, segments 3 and 4 as 7 : 6. Clypeus (Fig. 2) rectangularly incised upto $^1/_5$ of its length with truncate lateral teeth; labrum (Fig. 2) broader than long as 5 : 3 with roundly pointed anterior margin; malar space 0.5 × diameter of median ocellus. LID : IDMO : EL = 1 : 1.5 : 1.5; POL : OCL : OOL = 1 : 2 : 2. Frontal area below level of eyes, median fovea ditch-like having median longitudinal carina in its anterior half and posteriorly not reaching median ocellus; spraantennal tubercles moderate raised and confluenting with insignificant frontal ridges; post- and interocellar furrows absent, circumocellar one distinct, lateral furrows shallow, excurved (bulging); postocellar area subconvex, as long as broad, head norrowing behind eyes. ICD : ITD = 1 : 3.5, mesoscutellum (Fig. 6) pyramidally raised into acute apex, its appendage ecarinate; mesepisternum produced into acute apex. Mesosterna without thorns. Metabasitarsus shorter than following 3 joints combined as 4 : 5, metafemur equal to metatibia, tarsal claw (Fig. 4) with subapical toot shorter than apical one; IATS : MB : OATS = 1 : 2 : 0.75.
Genitalia: Penis valve (Fig. 16), gonoforceps (Fig. 19).
Sculpture: Head subshining with dense, minute, distinct punctation. Mesonotum punctate like head with sebaceous lustre; mesoscutellum with dense, minute, shallow punctation on its posterior slope, its appendage shallowly punctate and with faint wrinkles; mesepisternum and mesosternum having dense, fine, shallow punctation and with sebaceous lustre. Abdomen subshining, finely microstriated and with scattered shallow punctation.
Pubescence: Golden, 0.15 × scape length.

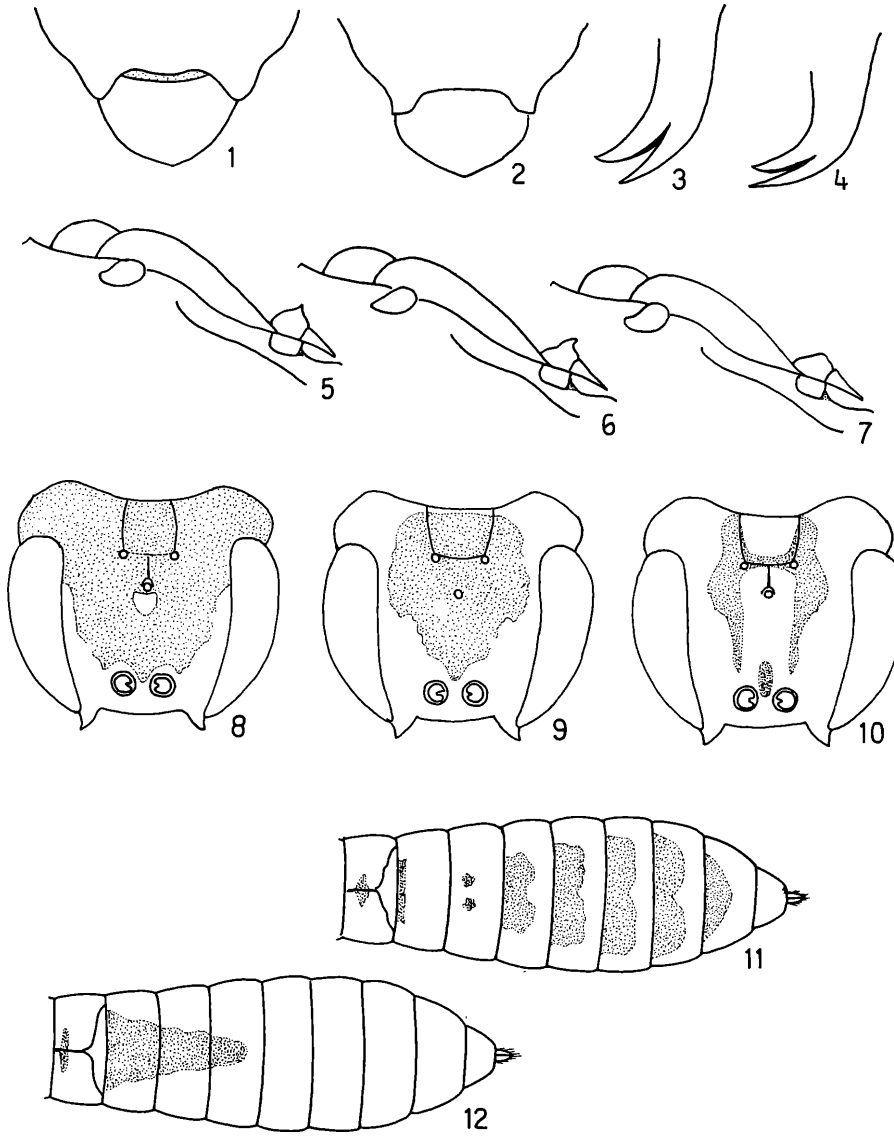
Material examined. – Holotype: Male, Arunachal Pradesh, Bomdila, 2550 m, 06. 05. 1992, coll. M. S. SAINI.

Individual variations. – Only holotype examined.

Distribution. – India: Arunachal Pradesh.

Discussion. – *T. quadratus* is related to *T. spinifera* (FORSIUS) but both can be easily identified and separated on the basis of some key characters already discussed under the latter. Some of the specific characters of *T. quadratus* include: postocellar area almost quadrate; scape and pedicel as 5 : 3; antennal segments 3 & 4 as 7 : 6, clypeus rectangularly incised with roundly pointed lateral teeth; malar space 0.5 × diameter of median ocellus and above all its specific colour pattern.
So far this species is based on males only but here is every possibility regarding the availability of its female counterpart provided the same area is visited towards the end of May. Area on the way to Sela top (Twang road) can also be explored from this angle. Bomdila which is generally engulfed with a thick blanket of fog and should actually be visited in the second half of the May when this problem is generally not there. Area of nine mile on way to Dirang is also very promising. The males were captured from though extremely disturbed gorges opposite the general Bus stand, yet these gorges are quite rich in vegetation and harbour some rare species of sawflies.

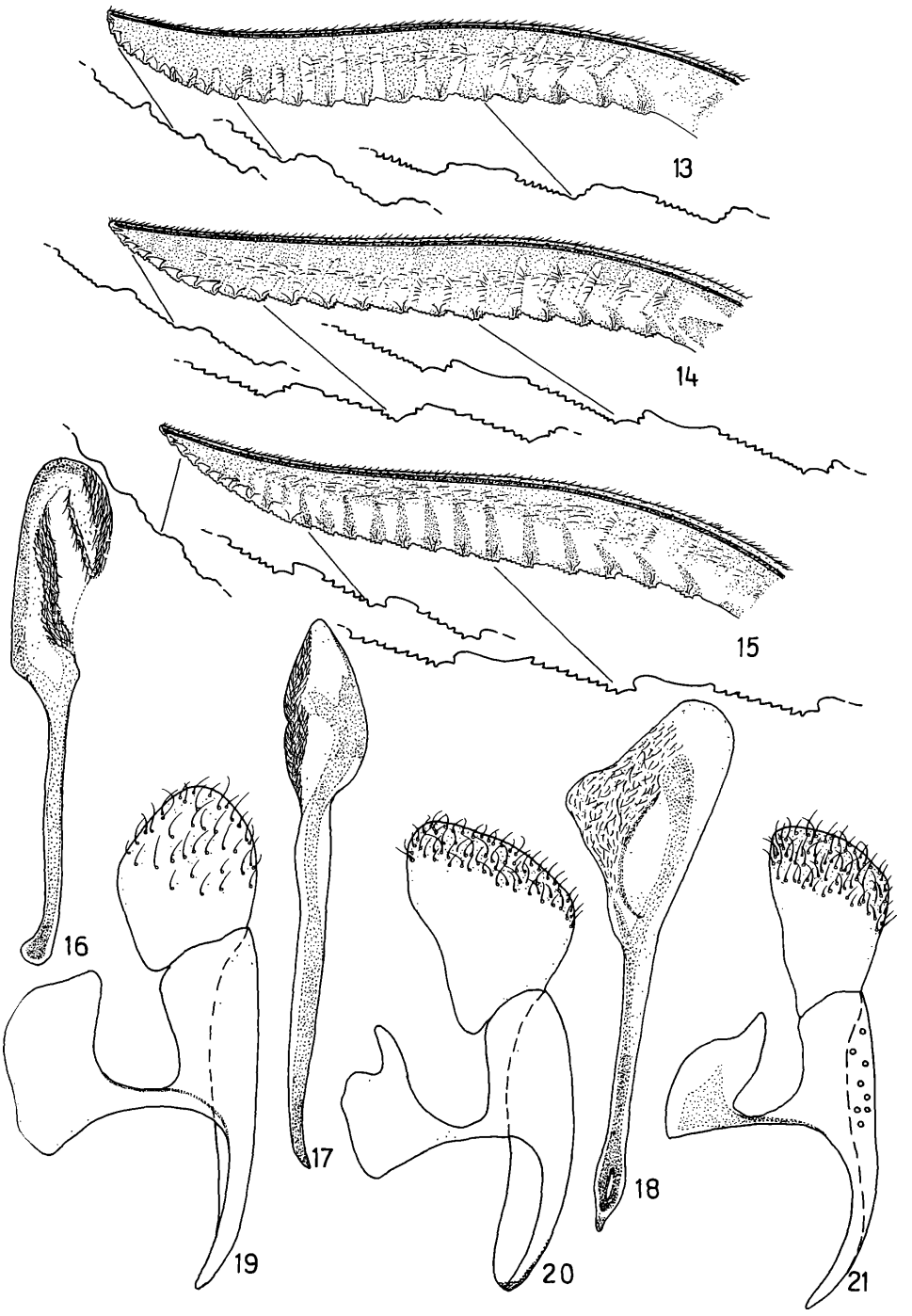
Etymology. – Species name alludes postocellar area being quadrate in outline.



Figs. 1–2: Clypeus and labrum (1 – T. *spinifera,* 2 – T. *quadratus*). – Figs. 3–4: Tarsal claw (3 – *T. spinifera,* 4 – *T. quadratus*). – Figs. 5–7: Mesoscutellum (5 – *T. spinifera,* 6 – *T. quadratus,* 7 – *T. maw*). – Figs. 8–10: Colour pattern of head (8 – *T. spinifera,* 9 – *T. maw,* 10 – *T. kashmirica*). – Figs. 11–12: Colour pattern of abdomen (11 – *T. maw,* 12 – *T. kashmirica*).

***Tenthredo maw* spec. nov.** (Figs. 7, 9, 11, 14, 17, 20)

Female. – Colour: Body sordid yellow, black are: antenna, except underside of segments 4–9, mandible apex; frontal spot (Fig. 9) anteriorly covering median fovea, laterally not touching eye margin and posteriorly reaching hypothetical hind margin of head; mesonotum except anterolateral angle of middle lobe and spot on posterolateral angle of lateral lobe; visible parts of metanotum; stripe along convexity of mesepisternum; anteromedial triangular spot on propodeum, narrow anterior margin of



Figs. 13–15: Lancet (13 – *T. spinifera*, 14 – *T. maw*, 15 – *T. kashmirica*). – Figs.: 16–18: Penis valve (16 – *T. quadratus*, 17 – *T. maw*, 18 – *T. kashmirica*). – Figs. 19–21: Gonoforceps (19 – *T. quadratus*, 20 – *T. maw*, 21 – *T. kashmirica*).

tergite 2 in middle, anterodorsal subrectangular spot on tergites 4–7 and anteromedial triangular spot on tergite 8 (Fig. 11); posterior stripe on trochanters, femora, tibiae and tarsi of front four legs; dorsal stripe on metatrochanter and metafemur, posterior stripe and apical $^1/_4$ of metatibia, metatarsi entirely. Wings yellowish hyaline, costa light brownish, stigma pale green, rest of venation fuscous to black.

Structure: Length 8.5 mm. Antenna stout, 1.7 × head width, flagellum not compressed; scape and pedicel as 3 : 2, segments 3 and 4 as 3 : 2. Clypeus subrectangularly incised upto $^1/_4$ of its length with rounded lateral teeth; labrum broader than long as 4 : 3 with rounded anterior margin, malar space 2.5 × diameter of median ocellus. LID : IDMO : EL = 1 : 1.5 : 1; POL:OCL:OOL = 1 1.2 : 2. Frontal area almost at level of eyes; median fovea almost obsolete; supraantennal tubercles insignificant and confluenting with similar frontal ridges; postocellar furrow distinct, inter- and circumocellar furrows absent. Lateral furrows fine, diverging posteriorly; postocellar area flat, broader than long as 3 : 2, head narrowing behind eyes. ICD : ITD = 1 : 4; mesoscutellum (Fig. 9) pyramidal, its appendage carinate; mesepisternum produced into acute apex, mesosternum lacking thorns. Metabasitarsus shorter than following 3 joints combined as 8 : 9, metafemur equal to metatibia, tarsal claw with subapical tooth shorter than apical one; IATS : MB : OATS = 1 : 2 : 0.75. Lancet (Fig. 14) with 21 serrulae.

Sculpture: Head opaque with dense, minute, distinct punctation. Mesonotum, mesoscutellum and its appendage punctate like head, surface opaque; mesepisternum and mesosternum with dense, fine, shallow punctation, and with sebaceous lustre. Abdomen subshining with faint microstriations and dense, shallow punctation.

Pubescence: Golden, 0.15 × scape length.

Male. – Length 7 mm. Similar to female except black in addition are: medial rectangular spot on propodeum, broad medial irregular club-shaped spot on tergites 2–4 anteriorly, tergites 5–8 with comparatively broad spots. Genitalia: Penis valve (Fig. 17), gonoforceps (Fig. 20).

Material examined. – Holotype: Female, Uttar Pradesh, Flower Valley, 3300 m, 24. 07. 1992, coll. V Vasu. Paratype: 1 ♂ with same data as holotype.

Individual variations. – Only type specimens studied.

Distribution. – India: Uttar Pradesh.

Discussion. – *Tenthredo maw* can be grouped with *T. kashmirica* MALAISE because they share some characters such as: head spotted and legs striped with black; postocellar area distinctly broader than long; mesoscutellum pyramidally raised; mesosternal thorns wanting and the costa and stigma pale, at the most pale brown but always transparent. Both can be easily distinguished from their allied species i.e. *T. casta* KONOW because in this head and legs are entirely pale without any black.

T. maw spec. nov. and *T. kashmirica* MALAISE can be differentiated as: postocellar area entirely pale, supraantennal tubercles cut off from frontal ridges; head almost impunctate and shining; post-, inter- and circumocellar furrows distinct and median fovea ditch-like in the latter, while postocellar area entirely black; supraantennal tubercles confluenting with low lying or wanting frontal ridges; head subrugose and opaque, post-, inter- and circumocellar furrows absent and median fovea almost wanting in *T. maw* spec. nov.

The collection locality of this species is much disturbed due to deforestation, natural calamities (excess snowfall, glaciers) and frequent visiters who come to pay homage at Gurdwara Hemkunt Sahib. With extensive survey a few more individuals of this species may be collected, but very large population will never be available. New species generally available at Flower valley are mostly not available at any other place in Uttar Pradesh. The reason is yet to be ascertained.

Etymology. – Species name is an arbitrary combination of letters derived from **M**edian fovea **A**lmost **W**anting.

Tenthredo kashmirica MALAISE (Figs. 10, 12, 15, 18, 21)

Tenthredo kashmirica MALAISE, 1934: 6, 1945: 249, SINGH & SAINI, 1986: 42.

Female. – Colour: Body pale green, black are: antenna except underside, median fovea anteriorly, interocellar area connected with lateral spot outer to lateral furrows and frontal ridges (Fig. 10); median transverse stripe on pronotom, seams of mesonotum, visible parts of mesopostnotum, posterior margin of metanotum; anteromedial spot on propodeum, single medial deltoid spot on tergites 2–4 (Fig. 12); posterior dot on all trochanters, posterior stripe on all femora, posterior stripe each on entire on all femora, posterior stripe each on entire pro- and mesotibiae more or less, and on basal $^1/_3$ of metatibia; all tarsi with reddish tinge. Wings hyaline, costa and stigma pale green, rest of venation fuscous to black.

Structure: Average length 9 mm. Antenna filiform, 1.7× head width, flagellum not compressed; scape and pedicel as 5 : 4, segments 3 and 4 as 3 : 2. Clypeus rectangularly incised upto $^1/_6$ of its length with truncate lateral teeth, labrum broader than long as 5 : 4 with subpointed anterior end, malar space 2× diameter of median ocellus. LID : IDMO : EL = 1 1.4 : 1; POL : OCL : OOL = 1 1.7 : 2. Frontal area below level of eyes; median fovea prominent between supraantennal tubercles and posteriorly obsolete due to transverse ridge, supraantennal tubercles distinctly raised and separated from almost similar frontal ridges by shallow furrow; post-, inter- and circumocellar furrows distinct; lateral furrows distinct, diverging posteriorly; postocellar area broader than long as 3 : 2; head narrowing behind eyes. ICD : ITD = 1 : 3.5, mesoscutellum pyramidal, its appendage carinate, mesepisternum produced into acute apex, mesosternum with insignificant thorns. Metabasitarsus shorter than following 3 joints combined as 4 : 5, metafemur equal to metatibia, tarsal claw with subapical tooth distinctly shorter than apical one; IATS : MB : OATS = 1 : 2 : 0.8. Lancet (Fig. 15) having 23 serrulae.

Sculpture: Head subopaque with dense, fine, shallow punctation. Mesonotum subopaque with dense, minute, shallow, distinct punctation; mesoscutellum and its appendage punctated like head; mesepisternum shining with dense, minute, shallow, confluenting punctation on convexity; mesosternum punctulate. Abdomen microstriated with dense, shallow punctation.

Pubescence: Golden, 0.15× scape length.

Male. – Length 9 mm. Similar to female excepting median fovea shallowly reaching median ocellus, malar space 1.5× diameter of median ocellus; posterior black stripe of legs and deltoid spot of abdomen missing. Genitalia: Penis valve (Fig. 15), gonoforceps (Fig. 18).

Material depository. – Holotype: NHM, London.

Material examined. – Specimens: Jammu & Kashmir, Gulmarg, 3000 m, 1 ♂, 30. 04. 1984, coll. M. S. SAINI. Uttar Pradesh, Hemkunt, 3500 m, 1 ♂, 28. 07. 1993, coll. V VASU; Chopta, 2700 m, 1 ♀, 15. 06. 1994, coll. V VASU.

Individual variations. – All specimens alike.

Distribution. – India: Jammu & Kashmir, Uttar Pradesh.

Discussion. – *T. kashmirica* MALAISE is close to *T. maw* spec. nov. but both can be easily separated as discussed under the latter. According to MALAISE's (1945) key, it goes close to *T. minshanica* MALAISE from China but both can be set aside as in the latter supraantennal tubercles are obtuse, gently sloping towards the shallow median fovea between them, head elongate in lateral view, flagellum of antenna black and mesonotum 3 with black spots in addition to the black seams. However, in *T. kashmirica* MALAISE supraantennal tubercles are abruptly and steeply raised from almost flat bottom of median fovea; head short in lateral view, underside of flagellum not black and the black colour of mesonotum is confined to seams only.

This species though confined to a very large area (almost entire western Himalaya) yet it is not very frequently available in nature. Generally collected along with *T. fallax, T. trunca,* yet as compared to the latter two its percentage in the nature is only microscopic. Area of Kalamunitop, Chopta, Rudranath and Roop Kund can be explored for its further collection.

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