

A TAXONOMIC KEY TO THE WATER MITES (HYDRACARINA) OF PAKISTAN

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Taxonomic studies are carried out on the aquatic mites collected from various localities of Pakistan. The collection belong to 12 families 13 genera and 15 species. A key to the genera and description of species is given.

Key words: Fresh water, Mites, Pakistan.

Introduction

Lundblad [19] carried out some taxonomic work on the aquatic mites from different areas of occupied Kashmir, Tibet and Pakistan. Imamura [3-18], Newell [20], Cook [1], Dewez [2] carried out similar studies on the aquatic mites from different regions of the world other than Pakistan. A part from Lundblad [19] no taxonomic work has been done on this group in Pakistan. We describe species of aquatic mites collected from different parts of Pakistan since 1962.

Material and Methods

30 samples of mites from 21 different localities were taken with the help of plankton net and dipnets and preserved in 5% formalin. All the specimens were identified to species. All diagrams were made with the help of camera lucida. For the preparation of generic key we have followed Newell [20] and Cook [1].

Key to Genera of *Acari parasitengona*

1. Distal end of tibia not produced to form dorsal spine....2
 - Distal end of tibia (P-4) produced in form of distidorsal spine projecting beyond insertion of tarsus.....11
 2. Three pairs of genital acetabula.....3
 - More than three pairs of genital acetabula.....8
 3. Genital acetabula not inseparably embedded in the genital plates; epimere 2nd and 3rd partially fused.....
 -*Lebertia* Neumann 1880 (Fig. 2-4).
 - Genital acetabula inseparably embedded in the genital plates; epimere 2nd and 3rd not fused.....4
 4. 2nd Epimeroglandularia behind epimere-i.....5
 - 2nd Epimeroglandularia in the anterior margin of epimere-iv, or in close contact with the sutures between epimere-iii and epimere-iv.....6
 5. Tarsus of the 4th leg with claws.....7
 - Tarsus of 4th leg without claws. *Limnesia* Koch 1836 (Figs. 8-10)
 6. Capitulum jointed with epimere-I; 2nd epimeroglandularia in the extreme anterior margin of epimere-iv; P-4 with

no prominent ventral spine or tubercle. *Hygrobates* Koch 1837 (Figs. 11-13)

-- Capitulum separated from epimere-I; 2nd epimeroglandularia away from the anterior margin of epimere-IV; P-4 with more than 20 dorsal spine. *Atractides* Koch 1837 (Fig. 1)

7. Pregenital and postgenital sclerite absent. *Tyrrellia* Koenike 1895 (Fig. 5-7).

-- Pregenital and postgenital sclerite present. *Wettina* Piersig 1892 (Fig. 15-18).

8. 6 Pairs of genital acetabula, not pit like. *Torrenticola* Piersig 1896 (Fig. 14).

-- More than 6 pairs of genital acetabula, pit like.....9

9. Distal end of tibia (p-4) 2 to 3 times as high as base of tarsus. *Arrenurus* Duges 1834 (Fig. 33-35).

-- Distal end of tibia not higher than base of tarsus.....10

10. Eyes with a median transverse ocular bridge; 3rd and 4th epimere contiguous only medially, diverging laterally; genital plates nearer to epimere than to body. *Eylais* Latreille 1796 (Fig. 19-28).

-- Eyes without median ocular bridge; 3rd and 4th epimere contiguous throughout; genital plates nearer to end of body than to epimere. *Unionicola* Haldeman 1842 (Fig. 29-32)

11. Acetabula stalked.....13

-- Acetabula not stalked.....12

12. Genital opening covered by a single operculum bearing 200-300 acetabula; operculum often largely enclosed by 3rd and 4th epimere; distidorsal process of P-4 short and robust. *Hydrachna* Muller 1776 (Fig. 36-37).

-- Genital opening not covered by a single operculum, but guarded by paired valves; Genital valves each bearing 30-60 acetabula; Valves not enclosed by 3rd and 4th epimere; distidorsal process of P-4 long and slender. *Hydrodroma* Koch 1837 (Fig. 38-39).

13. 15 Pairs of stalked genital acetabula; claws pectinate. *Protzia* Piersig 1896 (Fig. 40-44).

Systematic Account

Superfamily: **LEBERTIOIDEA** Viets 1935

Family: **LEBERTIOIDAE** Thor 1900

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Lebertia (Pilolebertia) carmamaya Cook 1966 (Fig. 2-4):

Body size 750 μ -1 mm; body oval; integument smooth; colour white or whitish yellow; Palp 5-segmented, median surface of P-3 with 5 long setae; 3 pairs of oval-shaped genital acetabula; legs II, III, and IV with many long swimming hairs.

Material examined. 3 ♂, 11 ♀, Punjab: Islamabad (A pool near Zero Point), Rawalpindi (Stream Azad Pattan, Barakahu, Nadna, Fatehjang, Haro River), NWFP: (Mansehra Stream, Siran River), South Waziristan (A pool Drazinda). 12-1-82, 3-3-68, 3-1-85, 18-5-85, 21-12-74, 28-3-72, 14-4-74, Leg. S.R. Ali; Lodged at: PMNH.

Family: **TORRENTICOLIDAE** Piersig 1902

Torrenticola (Torrenticola) tetraporella Cook 1966 (Fig. 14).

Body length 1 mm; body form oval, narrow anteriorly; colour white; dorsum with one anterior median and one anterior lateral platelets on each side, dorsum covered with spines; 6 pairs of elongated genital acetabula lying inside the genital opening; tarsus IV with claw.

Material examined. 1 ♂, 1 ♀, Punjab: Rawalpindi (Barakahu, Haro River), 31-1-85, 21-10-74, Leg. S.R. Ali; Lodged at: PMNH.

Superfamily: **PIONOIDEA** Viets 1930

Family: **HYGROBATIDAE** Koch 1842

Atractides (Atractides) ootacammundis Cook, 1966 (Fig. 1).

Body size 1 mm; colour brownish; numerous glandularia on dorsal surface are chitinized and appear as circular spot; 3 pairs of genital acetabula, pregenital sclerite crescent shaped, post genital sclerite semilunar shaped.

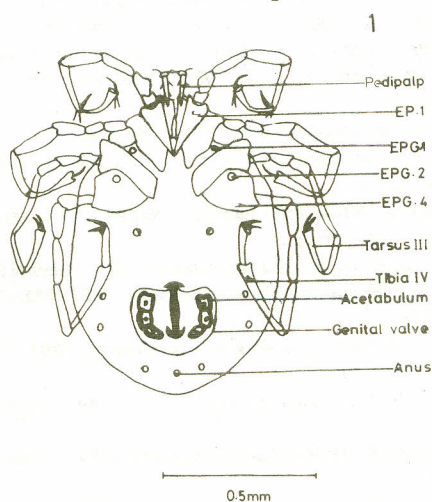


Fig. 1. Schematic diagram of a typical mite. *Atractides (Atractides) ootacammundis* Cook, 1966. (ventral view).

Material examined. 2 ♂, 4 ♀, Punjab: Rawalpindi (Nadna, Fatehjang), 18-5-85; Leg. S.R. Ali; Lodged at: PMNH.

Hygrobatas (Monobates) Karekari Cook 1966 (Fig. 11-12).

Body size 1 mm; colour white to brown; acetabular plates narrow, 3 pairs of oval-shaped genital acetabula lying outside the genital openings; tarsus IV with claws.

Material examined. 2 ♂, Punjab (Panjar Stream), NWFP: (Mansehra Stream), 5-1-67, 28-2-73; Leg. S.R. Ali; Lodged at: PMNH.

Hygrobatas (Monobates) Keralensis Cook 1966 (Fig. 13). Body size 1 mm; colour brownish; from rounded; acetabular plate broad, 3 pairs of genital acetabula, triangular in shape, attached to the wall of the genital valve.

Material examined. 2, ♂, Punjab (Haro River), 21-12-74; Leg. S.R. Ali; Lodged at: PMNH.

Family: **LIMNESIIDAE** Thor 1900

Limnesia (Limnesia) lembangensis Piersig 1897-1900 (Figs. 8-10). Body size 1 mm; colour white; oval in shape; capitulum lacking a long rostrum; 3 pairs of discoidal genital acetabula; tarsus of 4th leg claw less, spines strong.

Material examined. 1 ♀, Punjab (Panjar Stream), Jan. 1967; Leg. S.R. Ali; Lodged at: PMNH.

Family: **TYRRELLIIDAE** Viets 1935

Tyrrellia (Tyrrellia) crenophila Lundblad 1936 (Fig. 5-7).

Body size 794 μ - 1 mm; colour white; palp 5-segmented, 3 thick spines on P-3 and one at the base of P-4; 3 pairs of acetabula, 2 posteriorly and one anteriorly, oval in shape; lying free in the genital valve; claws without clawlets, legs with spines and no swimming hairs present.

Material examined. 4 ♂, Punjab, Rawalpindi (Azad Pattan), NWFP: D.I. Khan (Pond) 13-4-69, 5-5-66; Leg. S.R. Ali; Lodged at: PMNH.

Family: **UNIONICOLIDAE** Oudemans 1909

Unionicola (Polytax) thompsoni Cook 1974 (Figs. 29-32). Body size 1mm-1.25mm; colour white; genital field near the posterior end of the body; 35 or more than 35 acetabula on the two acetabular plates of each side; tarsi with spine and tarsus IV with claws.

Material examined. 2 ♂, Punjab: Rawalpindi (Dungi lake), 5-10-81; Leg. S.R. Ali; Lodged at: PMNH.

Family: **PIONIDAE** Thor 1900

Wettina octopora Cook 1956 (Fig. 15-18).

Body size 1 mm; colour brownish; body form oval, body soft; palp 5-segmented, a thick spine in the mid ventral of Palp male genital field without an associated petiole; 3 pairs of

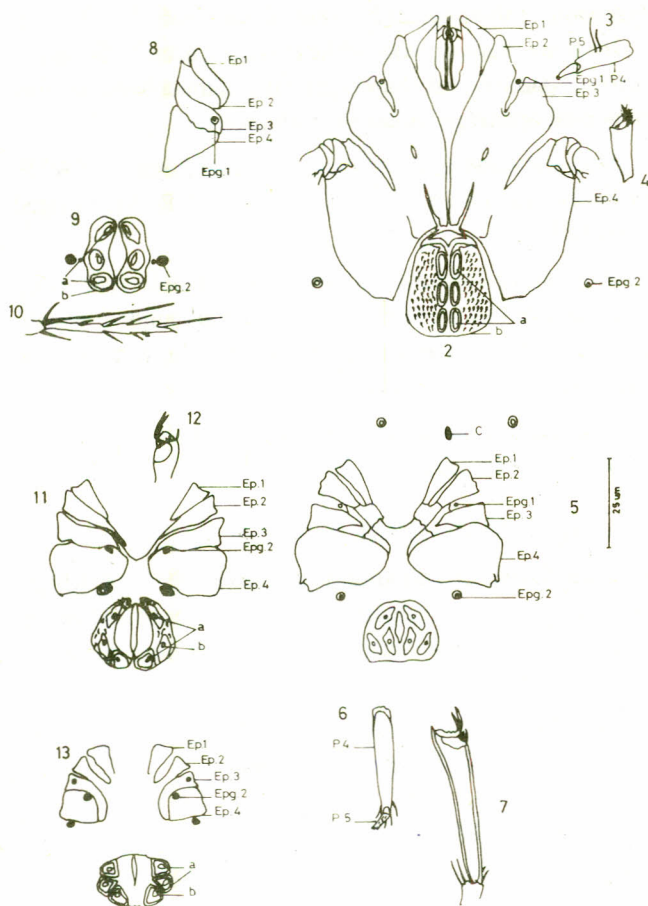


Fig. 2. *Lebertia (Pilolebertia) carmamaya* Cook, 1966. (ventral view female), Ep.1, Ep. 2, Ep. 3, Ep. 4, (Epimere 1,2,3,4), Epg.1, Epg. 2, (Epimeroglandularia 1, 2,).

Fig. 3. (a) Genital acetabula, (b) Genital valve, (c) Anus. P-4, P-5 (Palp, female).

Fig. 4. *Lebertia (Pilolebertia) carmamaya* Cook, 1966. Tarsus of leg IV (IV-6) with claws..

Fig. 5. *Tyrrellia (Tyrrellia) crenophila* Lundblad 1936., Ep. 1, Ep. 2, Ep. 3, Ep. 4 (Epimere), Epg. 1, Epg. 2, (Epimeroglandularia), (a) Genital acetabula, (b) Genital valve..

Fig. 6. *Tyrrellia (Tyrrellia) crenophila* Lundblad 1936. P-4, P-5 (Palp, male).

Fig. 7. *Tyrrellia (Tyrrellia) crenophila* Lundblad 1936. Tarsus of IVth leg (IV-6) with claws, male..

Fig. 8. *Limnesia (Limnesia) lembangensis* Piersing, 1897-1900 (Ventral view, female), Ep. 1, Ep.2, Ep. 3, Ep. 4 (Epimere), Epg.1, Epg. 2 (Epimeroglandularia-1).

Fig. 9. *Limnesia (Limnesia) lembangensis* Piersig, 1897-1900. Genital valve with genital acetabula. Epg. 2, female..

Fig. 10. *Limnesia (Limnesia) lembangensis* Piersig, 1897-1900. IV-6 with out claws, female..

Fig. 11. *Hygrobatas (Monobates) karekari* Cook, 1966. (Ventral view male), Ep. 1, Ep. 2, Ep. 3, Ep. 4 (Epimere), Epg. 1, Epg. 2 (Epimeroglandularia-2), (a) Genital acetabula, (b) Genital valve.

Fig. 12. *Hygrobatas (Monobates) karekari* Cook, 1966. Tarsus IV (IV-6) with claws, male.

Fig. 13. *Hydrobatas (Monobates) keralensis* Cook, 1966 (Ventral view, female), Ep. 1, Ep.2, Ep. 3, Ep.4 (Epimere), Epg. 1, Epg. 2, (Epimeroglandularia-2), (a) Genital acetabula, (b) Genital valve.

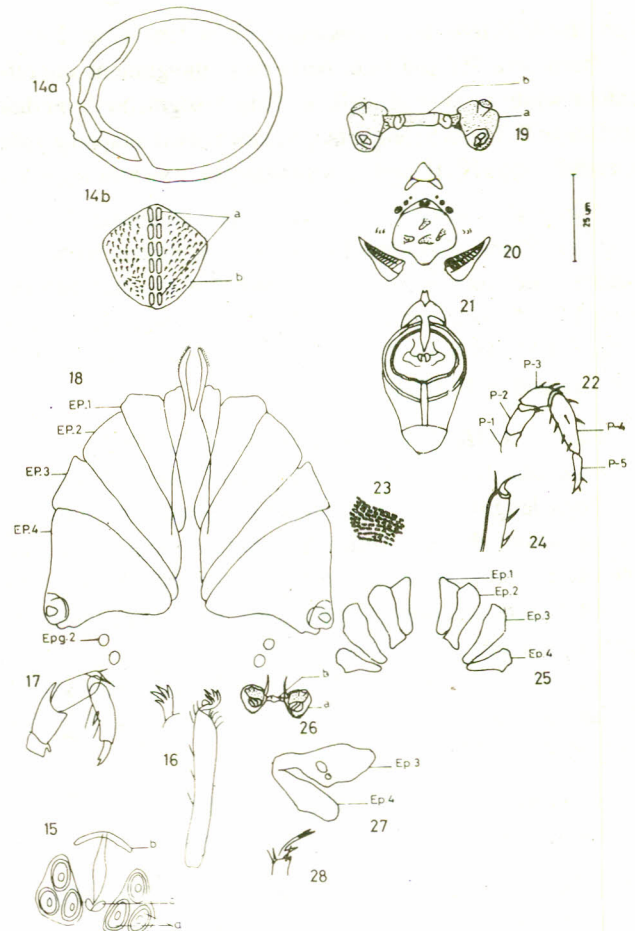


Fig. 14(a). *Torrenticola (Torrenticola) tetraporella* Cook, 1966. (Dorsal view, female).

Fig. 14(b). *Torrenticola (Torrenticola) tetraporella* Cook, 1966 (Ventral view, female), (a) Genital acetabula, (b) Genital valve.

Fig. 15. *Wettina octopora* Cook, 1956. (Genital field, female), (a) Genital acetabula, (b) Pregenital sclerite, (c) Post genital sclerite.

Fig. 16. *Wettina octopora* Cook, 1956. Tarsus IV, claw with clawle female.

Fig. 17. *Wettina octopora* Cook, 1956, (Palp, female)..

Fig. 18. *Wettina octopora* Cook, 1956. (Ventral view, female), Ep. Ep.2, Ep.3, Ep.4. Epg.2.

Fig. 19. *Eylais (Metaeylais) hamata* Koenike, 1897., (a) Eyes, (b) Transverse ocular bridge, male..

Fig. 20. *Eylais (Metaeylais) hamata* Koenike, 1897., Genital field, male

Fig. 21. *Eylais (Metaeylais) hamata* Koenike, 1897., Maxillary org: from beneath, male.

Fig. 22. *Eylais (Metaeylais) hamata* Koenike, 1897., Palp with I 1, P-2, P-3, P-4, P-5, male.

Fig. 23. *Eylais (Metaeylais) hamata* Koenike, 1897., Epimeral structure, male.

Fig. 24. *Eylais (Metaeylais) hamata* Koenike, 1897., Tarsus IV (IV-4) with claw, male.

Fig. 25. *Eylais (Metaeylais) hamata* Koenike, 1897., Epimere 1,2,3,4 male.

Fig. 26. *Eylais (Protoeylais) degenerata* Koenike, 1897., (a) Eye, (b) Transverse ocular bridge, female.

Fig. 27. *Eylais (Protoeylais) degenerata* Koenike, 1897., Epimere 4., female.

Fig. 28. *Eylais (Protoeylais) degenerata* Koenike, 1897., Tarsus IVth leg with claws, female.

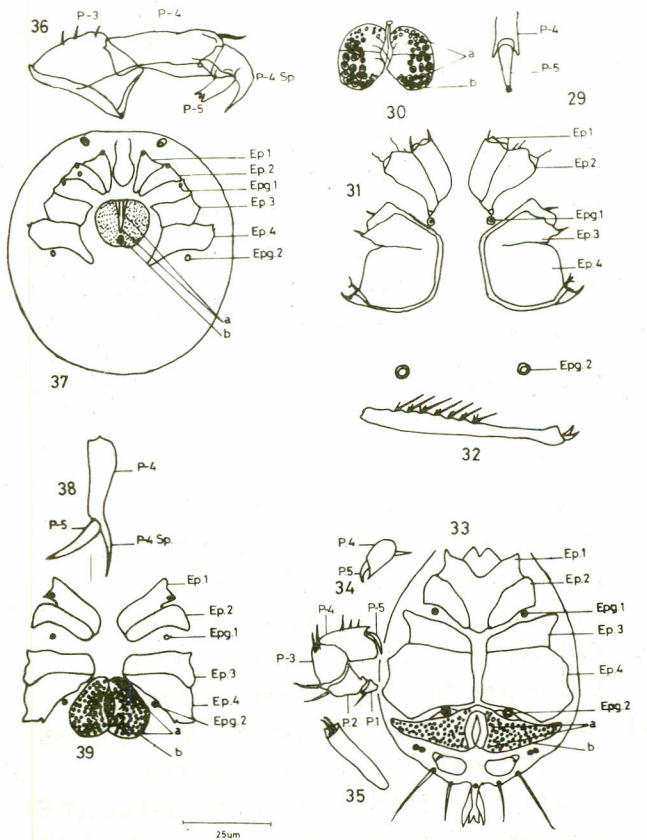


Fig. 29. *Unionicola (Polytax) thompsoni* Cook, 1974., (Ventral view, female), P-4, P-5 (Pedipalp).

Fig. 30. *Unionicola (Polytax) thompsoni* Cook, 1974., (a) Genital acetabula, (b) Genital valve, female.

Fig. 31. *Unionicola (Polytax) thompsoni* Cook, 1974., Ep. 1, Ep. 2, Ep. 3, Ep. 4 (Epimere), Epg. 1, Epg. 2. (Epimeroglandularia) female.

Fig. 32. *Unionicola (Polytax) thompsoni* Cook, 1974., Tarsus of IVth leg with claws, female.

Fig. 33. *Arrhenurus (Rhinophoracarus) truncatus* Walter, 1929., (Ventral view, male), Ep. 1, Ep. 2, Ep. 3, Ep. 4 (Epimere), Epg. 1, Epg. 2, (Epimeroglandularia), (a) Genital acetabula, (b) Genital valve.

Fig. 34. *Arrhenurus (Rhinophoracarus) truncatus* Walter, 1929., Palp with P-1, P-2, P-3, P-4, P-5, male.

Fig. 35. *Arrhenurus (Rhinophoracarus) truncatus* Walter, 1929., Tarsus IV with claws, male.

Fig. 36. *Hydrachna (Scutohydrachna) testudinata* Cook, 1966., Ep. 1, Ep. 2, Ep. 3, Ep. 4 (Epimere), Epg. 1, Epg. 2. (Epimeroglandularia), (a) Genital acetabula, (b) Genital operculum, male.

Fig. 37. *Hydrachna (Scutohydrachna) testudinata* Cook, 1966., P-4, P-4, Spine, P-5, male.

Fig. 38. *Hydrodroma monticola* (Piersig) 1897-1900, (P-4, P-4, Spine, P-5, female).

Fig. 39. *Hydrodroma monticola* (Piersig) 1897-1900, (Ventral view, female), Ep. 1, Ep. 2, Ep. 3, Ep. 4, (Epimere), Epg. 1, Epg. 2, (Epimeroglandularia), (a) Genital acetabula, (b) Genital valve.

oval shaped genital acetabula, pregenital sclerite crescent shaped and post genital sclerite curved or semilunar.

Material examined. 1 ♂, 1 ♀, Punjab: Rawalpindi (Stream Panjar, Azad Pattan), Feb. 1962, 13-4-69; Leg. S.R. Ali; Lodged at: PMNH.

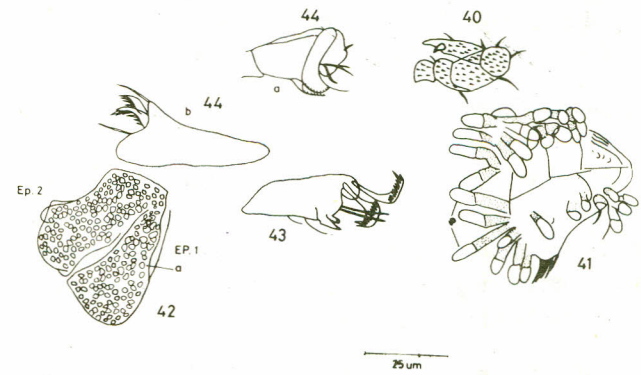


Fig. 40. *Protzia (Calonyx) flagellum*, Lundblad, 1934., Palp, female.

Fig. 41. *Protzia (Calonyx) flagellum*, Lundblad, 1934., Female genital field, a. Genital acetabula.

Fig. 42. *Protzia (Calonyx) flagellum*, Lundblad, 1934., Ep. 1, Ep. 2, (Epimere, female), (a) Structure of pores.

Fig. 43. *Protzia (Calonyx) flagellum*, Lundblad, 1934., Tarsus of IVth leg, with claws and clawlets, female.

Fig. 44. End segment of a leg seen from side, female.

Superfamily: LIMNOCHAROIDEA Viets 1926

Family: EYLAIIDAE Leach 1815

Eylais (Metaeylais) hamata Koenike 1897 (Fig. 19-25).

Body size 2 mm; soft bodied red mite; body form oval; ocular bridge thin and slender; pharynx distinctly set off from posterolateral projections of capitulum.

Material examined. 1 ♂, Punjab, Sargodha (A water logged pond, Mianwali), April, 1966; Leg. S.R. Ali; Lodged at: PMNH.

Eylais (Protoeylais) degenerata Koenike 1897 (Fig. 26-28).

Body size 1 mm - 2.6 mm; colour white or reddish; ocular bridge v-shaped; pharynx indistinctly set off from the posterolateral projections of the capitulum.

Material examined. 15 ♂, NWFP: (Stream parachinar), Punjab: Faisalabad, 15-6-66, 18-3-75; Leg. S.R. Ali; Lodged at: PMNH.

Superfamily: ARRENUROIDEA Oudemans 1902

Family: ARRENURIDAE Thor 1900

Arrhenurus (Rhinophoracarus) truncatus Walter 1929 (Fig. 33-35).

Body size 790 μ - 1 mm; colour white or brownish; body nearly oval; male with a pronounced cauda behind anus which is longer than broad; cauda with a well developed petiole; pygal lobe of the cauda present but not well developed; genital valves broader than long; about 70 pit like genital acetabula in each valve; legs with swimming hairs, tarsi with claws.

Material examined. 1 ♂, 1 ♀, NWFP: (Pond D.I. Khan), Punjab: (Stream Panjar), 4-7-68, Jan. 67; Leg. S.R. Ali; Lodged at: PMNH.

Superfamily: **HYDRACHNOIDEA** Viets 1931

Family: **HYDRACHNIDAE** Leach 1815

Hydrachna (Scutohydrachna) testudinata Cook, 1966 (Fig. 36-37).

Body size 1 mm - 2.6 mm; colour white; body strongly rounded; dorsum covered by a dorsal shield, venter soft; genital field heart-shaped, genital opening covered by a single operculum bearing 200 minute pit like acetabula; operculum largely enclosed by epimere III and epimere IV.

Material examined. 18 o, 5 o, NWFP: (Pond D.I. Khan), Punjab: Pond (Tarnol), 7-4-68, 18-6-8. Leg. S.R. Ali; Lodged at: PMNH.

Superfamily: **HYDRYPHANTOIDEA** Viets 1931

Family: **HYDRODROMIDAE** Viets 1936

Hydrodroma monticola (piersig) 1997-1900 (Fig. 38-39).

Body size 795 μ - 1mm; colour white to red, form elongate; P-4 with a very long distidorsal process; 2 genital valves, more than 60 pit like genital acetabula in each valve.

Material examined. 3 o, Punjab: Rawalpindi (Tanaza Dan, Fatehjang; stream near Zero Point, Islamabad; Channi Borlake, Pindigheb), 7-11-81, 21-1-82, 1-4-82; Leg. S. R. Ali; Lodged at: PMNH.

Family: **PROTZIIDAE** Viets 1926

Protzia (Calonyx) flagellum Lundblad 1934 (Figs. 40-44).

Body size 1mm; colour white or yellowish white; soft bodied, skin without chitinous plate; distidorsal process of P-4 longer than P-5; 30 stalked genital acetabula are present, posterior acetabula are much more elongated; claws expended distally and with many clawlets; each claw consist of a central tooth and a number of short lateral teeth.

Material examined: 3 o, Punjab: Salgran, 27-12-84; Leg. S. R. Ali; Lodged at: PMNH.

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