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DESCRIPTIONS OF THE MITES OF THE GENUS *AMBLYDROMELLA* (Acarina : Phytoseiidae) FROM PAKISTAN

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Five new species of mites of the genus *Amblydromella* are described. *Typhlodromus zafari* Chaudhri has been transferred to this genus.

Amblydromella serratus, n. sp. is seemingly related to *Typhlodromus neobakeri* Prasad but the recurved tip of peritreme, setae L10 and VL1 with blunt tip, shape of spermatheca and distance between genital and ventrianal shields separate *serratus* from *neobakeri*.

Amblydromella incasus, n.sp. is separated from *Amblydromella maracus*, n.sp. on the basis of number of teeth on fixed digit of chelicera, shape of spermatheca, length of seta L2 and shape of ventrianal shield.

Amblydromella maracus, n.sp. is very near to *Amblydromella fleschneri* (Chant) but presence of metasternal setae on small platelets, number of teeth on fixed digit of chelicera and shapes of spermatheca and ventrianal shield separate these two species from each other.

Amblydromella ornatulus, n.sp. is closely related to of *Typhlodromus* (*Typhlodromus*) *rhenanus* Chant but shape of dorsal shield, size of dorsal setae, shape of ventrianal shield and shape of spermatheca separate these two species.

Amblydromella libitus, n.sp. is separated from *Amblydromella ornatulus*, n.sp. due to sclerotization of dorsal shield, number of pores on dorsal shield, length of setae L3, L4, and shape of ventrianal shield.

The phenetic similarities of these species have also been taken into consideration and are discussed in this paper.

INTRODUCTION

Nesbitt (1951) described 19 species of the genera *Typhlodromus* and *Phytoseius* then known Chant (1959) reviewed the family Phytoseiidae and divided it into two subfamilies viz., Macroseiinae and Phytoseiinae. He

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included 8 genera in the subfamily Phytoseiinae and genus *Typhlodromus* Scheuten was one of them. He further divided the genus *Typhlodromus* into 2 subgenera viz., *Amblysetus* and *Typhlodromus*. The subgenus *Typhlodromus* characterised by having 8—12 pairs of lateral setae, 2 to 4 pairs of preanal setae was again divided into 12 species groups on the basis of number of setae on dorsal shield and ventrianal shield. Chant (loc. cit.) included all the species taxa having 10 pairs of lateral setae and 4 pairs of preanal setae in the *rhenanus* group. He also placed *Typhlodromus* (*Typhlodromus*) *pyri* Scheuten species with 9 pairs of lateral setae in this group.

Muma (1961) classified the family Phytoseiidae and added 29 new genera to it. He mentioned *Neoseiulus* Hughes, *Amblydromella* Muma, *Clavidromus* Muma, *Anthoseius* DeLeon, *Typhlodromella* Muma and *Paraseiulus* Muma as having 10 pairs of lateral setae. He used number of setae on sternal shield, on ventrianal shield and macrosetae on leg IV as diagnostic characters for the separation of these genera. He kept the species with 9 pairs of lateral setae, 4 pairs of preanal setae and 1 macroseta on leg IV in the genus *Typhlodromus* Scheuten and transferred *T.* (*T.*) *pyri* Scheuten from the *rhenanus* group of Chant (1959) to the genus *Typhlodromus* as a type species. He separated these genera on the basis of the following characters :

Genus	Sternal Setae	Preanal Setae	Leg IV Macrosetae
Neoseiulus Hughes	3	3	0
Amblydromella Muma	3	3–4	3
Clavidromus Muma	2	3	3
Anthoseius DeLeon	2	3	0
Typhlodromella Muma	2	4	0–1
Paraseiulus Muma	2	2–4	0

Later on, many Acarologists viz., Pritchard and Baker (1962), Schuster and Pritchard (1963), Ehara (1964, 1966) retained *Neoseiulus* Hughes for the phytoseiid mites which had 10 pairs of lateral setae. Corpuz (1966), Prasad (1968), Wainstein (1958), Wainstein and Arutunjan (1968), Ehara and Lee (1971) placed their specimens with 10 pairs of lateral setae in the genus *Typhlodromus*. Muma and Denmark (1970) worked on the mite fauna of Florida and gave new classification of mites.

Muma (1967) synonymized genus *Typhlodromella* with the genus *Amblydromella* because *Amblydromella fleschneri* (Chant) and *Typhlodromella rhenanus* (Oudemans) the genotypes of these genera are morphologically very closely related. He also described 2 new species, *Amblydromella loraliana* and *Amblydromella ghanii* from the collection which was sent to him by Dr. M. A. Ghani, Entomologist Incharge, C.I.B.C. in Pakistan. This indicated the occurrence of genus *Amblydromella* in Pakistan.

Recently Dr. H.A. Denmark (personal communication, 1973) has also suggested to place the specimens collected from Pakistan in the genus *Amblydromella* rather than including in the genus *Anthoseius* DeLeon or *Typhlodromus* Scheuten. Keeping all this in view, the author thinks that the species which have been described in this paper, should be placed in the genus *Amblydromella* Muma as these species possess the characters of this genus.

KEY TO *AMBLYDROMELLA* MUMA IN PAKISTAN

(Females)

1. All dorsal setae simple (smooth) except *L*10 and *M*2 2
   All dorsal setae serrate except *D*1—*D*3, *M*1 and Cl..... *A. serratus*, n.sp.

2. Seta *L*10 serrate with bulbous tip; seta *VL*1 with bulbous tip 3

   Seta *L*10 serrate with pointed tip; seta *VL*1 with pointed tip..... 4

3. Fixed digit of chelicera with 5 subapical teeth; 3 pairs of visible pores on dorsal shield; seta *L*2 smaller than *L*2–*L*3; shape of spermatheca as illustrated (Fig. 2E) ..... *A. incasus*, n.sp.

   Fixed digit of chelicera with 6 subapical teeth; no visible pores on dorsal shield; seta *L*2 smaller than *L*2–*L*3; shape of spermatheca as illustrated (Fig. 3B) ..... *A. maracus*, n.sp.

4. Seta *M*2 serrate; macroseta only on leg IV basitarsus, pointed 5

   Seta *M*2 smooth; macrosetae on leg IV genu, tibia and basitarsus, spatulate ..... *A. zafari* (Chaudhri)

5. Movable digit of chelicera with 2 subapical teeth; 4 pairs visible pores on membrane surrounding ventrianal shield; shape of ventrianal shield as illustrated (Fig. 4F) *A. ornatulus*, n.sp.

   Movable digit of chelicera with 3 subapical teeth; 2 pairs of visible pores on membrane surrounding ventrianal shield; shape of ventrianal shield as illustrated (Fig. 5E) *A. libitus*, n.sp.

DESCRIPTIONS

1. *Amblydromella serratus*, new species

(Fig. 1)

Female: Dorsal shield reticulated, 347μ long, 194μ wide, concave near *S*2 (Fig. 1A), with 18 pairs of setae and a pair of visible pores. Chelicera 31μ long, 4 subapical teeth on fixed digit and 2 on movable digit (Fig. 1B). All dorsal setae serrate except *D*1—*D*3, *M*1 and *Cl*. All setae shorter than distance to seta next in line. Dorsal setae: *V* 18μ; *D*1 = *D*2 = 10μ, *D*3 13μ, *D*4 16μ; *Cl* 10μ; *L*1 = *L*2 = *L*3 = 13μ, *L*4 = *L*5 = 16μ, *L*6 = *L*7 = 18μ, *L*8 = *L*9 = 23μ, *L*10 31μ; *M*1 10μ, *M*2 21μ; *S*1 13μ, *S*2 18μ (Fig. 1A). Peritreme extending forward to seta *V*, slightly recurved at the tip (Fig. 1A). Peritremal shield as in figure 1C. Sternal shield with 2 pairs of setae, 3rd pair on the membrane. Metasternal setae on separate platelets. Ventrianal shield 120μ long 94μ, wide with 4 pairs of setae and a pair of pores. Four pairs of setae, 5 pairs of visible pores and a pair of minute platelets on membrane surrounding ventrianal shield, seta *VL*1 serrate, blunt and 34μ long. Genital shield and ventrianal shield 5μ apart with a membranous fold in between (Fig. 1G). Metapodal platelets 2 pairs, primary 26μ, secondary 9μ long (Fig. 1F). Spermatheca saccular as in figure 1D. Macroseta on leg IV basitarsus, 23μ long and knobbed (Fig. 1E).

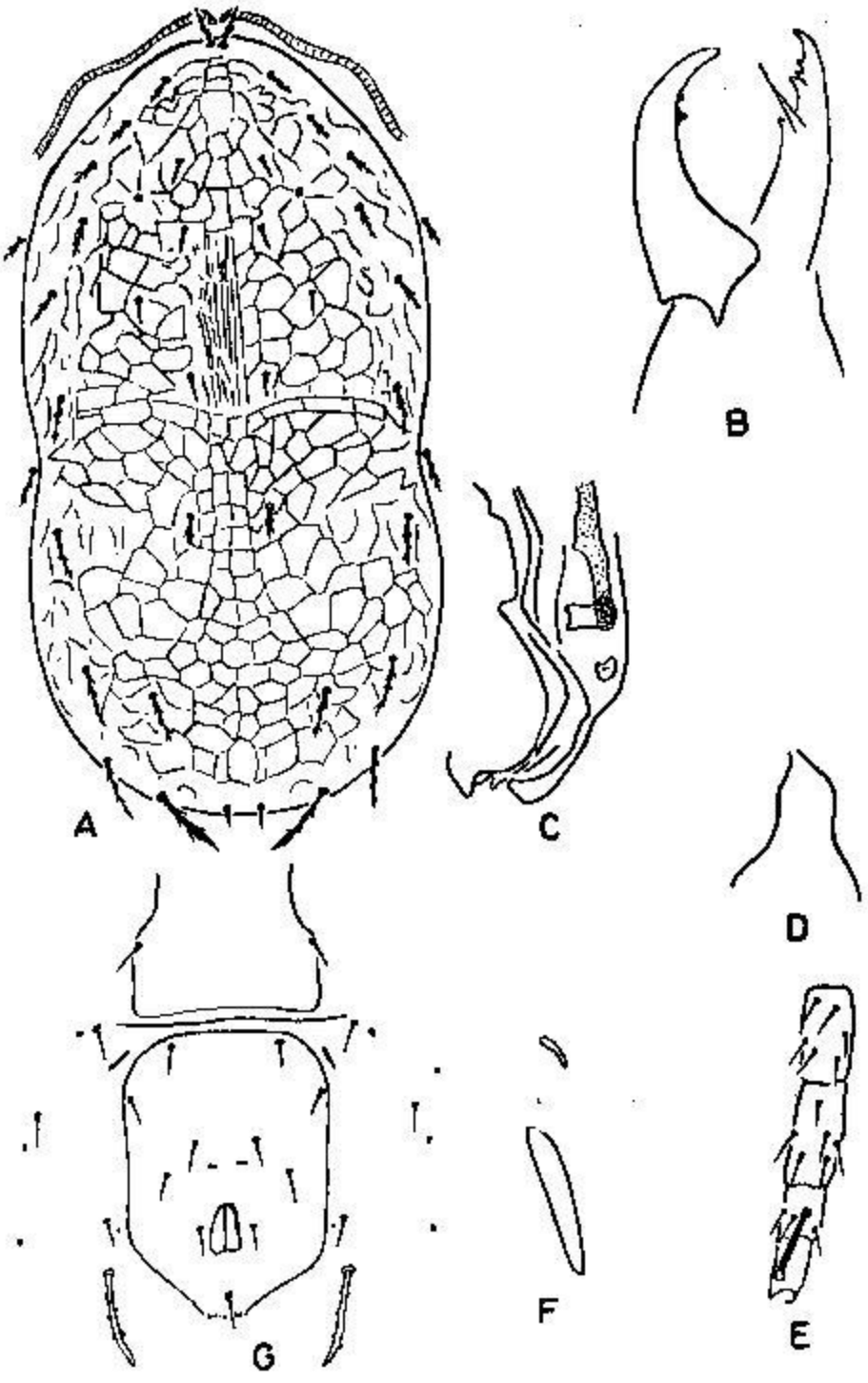

FIG. 1. *Amblydromella serratus*, n.sp. A, dorsal shield; B, chelicera; C, peritremal shield; D, spermatheca; E, leg IV; F, metapodal platelets; G, genital and ventrianal shields.

Male: Not known.

Type: Holotype female, collected Daphar Forest Plantation, 26.vii.1971 (Wali M. Chaudhri) from *Withania somnifera*, and deposited in the Department of Entomology, U.A.L. One female, same collection data. Two females, collected Changa Manga Forests, 17.iv.1971 from *Russelia equisetiformis*. One female, collected Daphar Forest Plantation, 26. vii. 1971 from *Artemisia* sp. Exemplary deposited in U.S.N.M.

Remarks: This species is seemingly related to *Typhlodromus neobakeri* Prasad due to reticulated dorsal shield, serrate dorsal setae, ventrianal shield with 4 pairs of setae and a pair of pores, knobbed macroseta on leg IV basitarsus. The following characters can be used for separating these 2 species.

1. Peritreme with recurved tip in this species as against straight tip in *neobakeri*.
2. Setae *L*10 and *VL*1 blunt in this species but knobbed in *neobakeri*.
3. Shape of spermatheca differs in both the species.
4. Genital and ventrianal shields about 5μ apart in this species but wider apart in *neobakeri*.

2. *Amblydromella incasus*, new species

(Fig. 2)

Female: Dorsal shield 344μ long, 196μ wide, deeply recurved near seta *S*2, reticulated, with 18 pairs of setae and 3 pairs of visible pores (Fig. 2A). Chelicera 27μ long, with 5 subapical teeth on fixed digit and 3 subapical teeth on movable digit (Fig. 2B). All setae simple, only *L*10 and *M*2 serrate, *L*10 with bulbous tip. Dorsal setae: *V* 18μ; *D*1 18μ, *D*2 20μ, *D*3 22μ, *D*4 26μ; *Cl* 8μ; *L*1 = *L*2 = 22μ, *L*3 = *L*4 = 23μ, *L*5 27μ, *L*6 29μ, *L*7 30μ, *L*8 31μ, *L*9 21μ, *L*10 47μ; *M*1 20μ, *M*2 31μ; *S*1 22μ, *S*2 24μ. All setae short of distance to seta next in line (Fig. 2A). Peritreme extending forward to base of seta *V*, slightly recurved. Sternal shield with 3 pairs of setae. Metasternal setae on separate platelets. Ventrianal shield as in figure 2F with 4 pairs of setae and a pair of pores. Four pairs of setae and 2 pairs of visible pores on the membrane surrounding ventrianal shield, seta *VL*1 with bulbous tip (Fig. 2F). Genital shield 83μ wide. Two pairs of metapodal platelets, primary 21μ, secondary 8μ long (Fig. 2D). Spermatheca as in figure 2E. Leg IV with macroseta on basitarsus with bulbous tip and 22μ long (Fig. 2C).

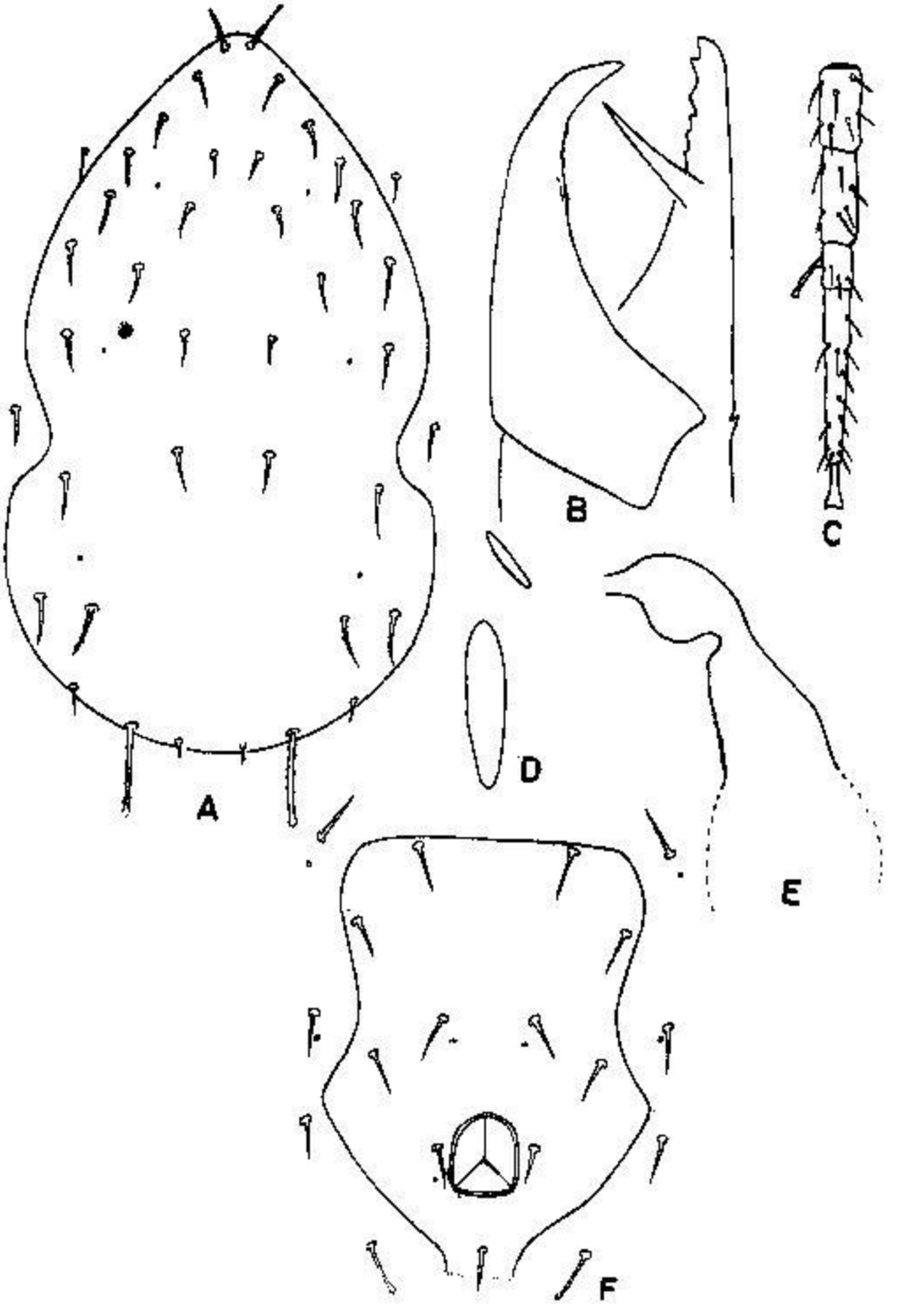

FIG. 2. *Amblydromella incasus*, n. sp., A, dorsal shield; B, chelicera; C, leg IV; D, metapodal platelets; E, spermatheca; F, ventrianal shield.

Male: Not known.

Type: Holotype female, collected 2 mi.S. Lyallpur 27.x.1965 (Wali M. Chaudhri) from *Datura innoxia*, and deposited in the Department of Entomology, U.A.L. Three females, collected Cheechawatni Forests, 19. viii. 1970 from *Aerua javanica*; 1 female, collected Rajana Forest, 21.x.1972 from *Achyranthes aspera*.

Remarks: This species is related to *Amblydromella maracus*, n.sp. They can be separated from each other on the basis of the following characters :

1. Fixed digit of chelicera with 5 subapical teeth in this species but 6 subapical teeth in *maracus*.

2. Shape of spermatheca differs in both the species.

3. Seta *L2* shorter than distance between *L2* and *L3* in this species but longer in *maracus*.

4. Shape of ventrianal shield differs in both the species.

3. *Amblydromella maracus*, new species
(Fig. 3)

Female: Dorsal shield 346μ long, 200μ wide, deeply concave near *S2*, faintly reticulated with 18 pairs of setae (Fig. 3A). Chelicera 29μ long with 6 subapical teeth on fixed digit and 3 subapical teeth on movable digit. All setae simple, setae *L10* and *M2* serrate, *L10* with bulbous tip (Fig. 3A). Dorsal setae: *V* 20μ; *D1* = *D2* = 14μ, *D3* 20μ, *D4* 24μ; *Cl* 10μ; *L1* 24μ, *L2* 14μ, *L3* = *L4* = *L5* = 24μ, *L6* 27μ, *L7* = *L8* = 31μ, *L9* 24μ, *L10* 41μ; *M1* 14μ, *M2* 34μ; *S1* 20μ, *S2* 22μ. Seta *L2* longer than distance between setae *L2* and *L3*, other setae shorter than distance to seta next in line (Fig. 3A). Peritreme with recurved tip, extending forward to base of seta *V*. Sternal shield with 3 pairs of setae. Metasternal setae on separate platelets. Genital shield 87μ wide, 12μ apart from ventrianal shield. Ventrianal shield rectangular, 112μ long, 75μ wide, anterior margin convex, 4 pairs of preanal setae and a pair of pores (Fig. 3E). Membrane surrounding ventrianal shield with 4 pairs of setae, seta *VL1* with bulbous tip. Two pairs of metapodal platelets, primary 17μ, secondary 10μ long (Fig. 3D). Spermatheca as in figure 3B. Macroseta on basitarsus of leg IV 22μ long, having bulbous tip (Fig. 3C).

Male: Not known.

Type: Holotype female, collected U.A.L. Campus., 10.x.1965 (Wali M.

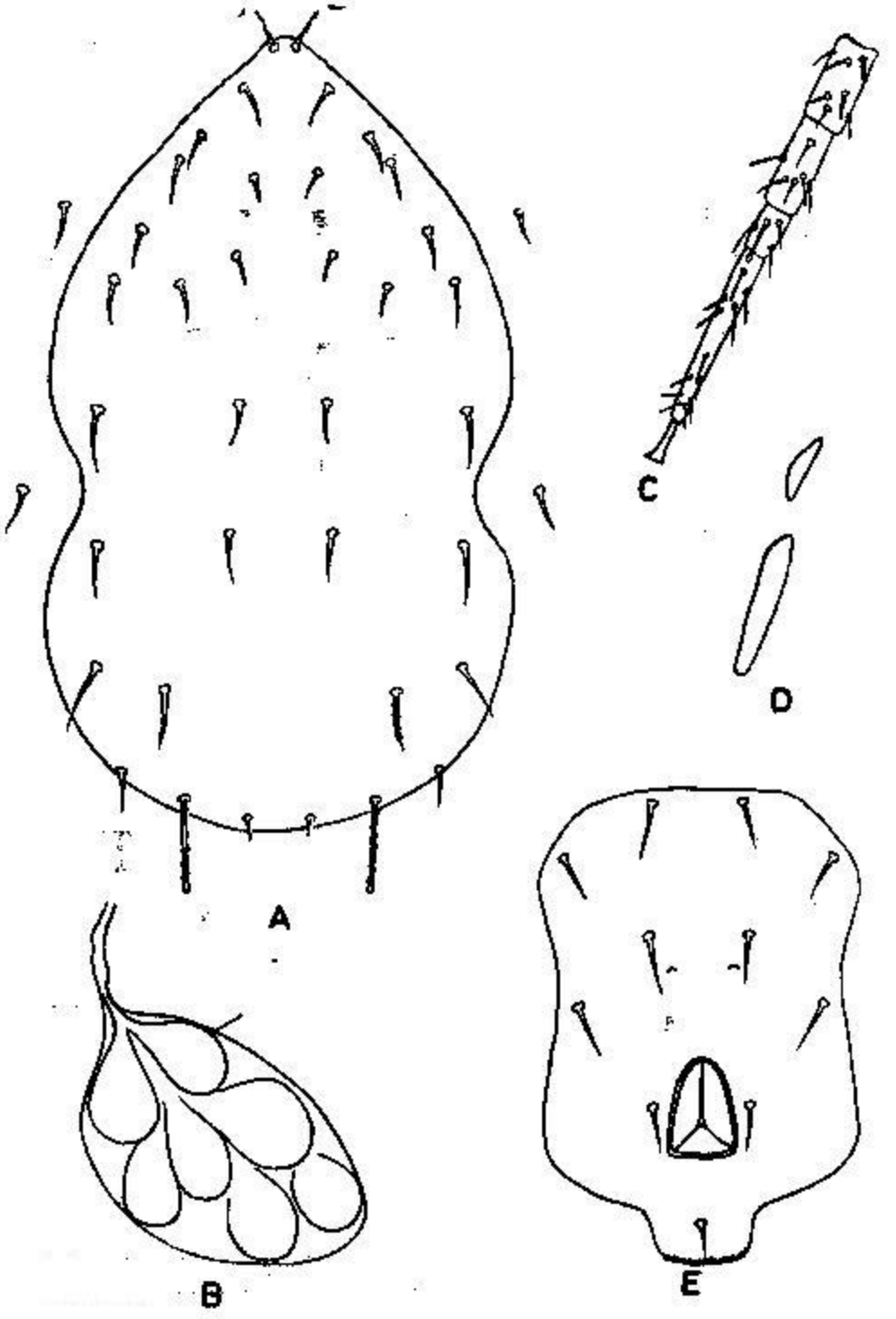

FIG. 3. *Amblydromella maracus*, n.sp., A, dorsal shield; B, spermatheca; C, leg IV; D, metapodal platelets; E, ventrianal shield.

Chaudhri) from *Mangifera indica*, and deposited in the Department of Entomology, U.A.L. One female, collected ShoreKot Road Forests, 8.viii.1970 from *Pupalia lappacea*; 1 female, 3 mi.S. Mianwali, 30.v.1972 from *Heterophragma adenophyllum*; 2 females, 1 mi.S. Mian Channu, 5.x.1972 from *Ficus palmata*. Exemplary deposited in U.S.N.M.

Remarks: This taxon is very near to *Amblydromella fleschneri* (Chant). The following characters make a line of demarcation between these 2 species :

1. Metasternal shield setae on small platelets in this species but on membrane in *fleschneri*.

2. Fixed digit of chelicera with 6 subapical teeth in this species as against 2 subapical teeth in *fleschneri*.

3. Shape of spermatheca and ventrianal shield differs in both the species.

4. *Amblydromella zafari* (Chaudhri)

Typhlodromus zafari Chaudhri, 1965: 632—635

This species closely resembles *Typhlodromus vulgaris* Ehara and *Typhlodromus* (*Typhlodromus*) *rhenanus* (Oudemans) in having 18 pairs of dorsal setae, reticulated dorsal shield, 4 pairs of preanal setae with a pair of pores. However, it can be separated from *vulgaris* and *rhenanus* on the basis of number of teeth on cheliceral digits. The fixed and movable digits each with 3 teeth in *vulgaris*; 4 and 2 teeth in *rhenanus*, respectively.

Type: Holotype female, collected 2 mi.E. Lyallpur, 16.x.1961 (Wali M. Chaudhri) from *Morus alba*, and deposited in the Department of Entomology, U.A.L. One female, same collection data.

New Records: One female, collected 3 mi.S. Sheikhupura, 25.xi.1970 from *Peristrophe bicalyculata*; 1 female, collected 3 mi.S.Gujrat, 10.xii.1970 from *Blumea* sp.; 1 female, collected 1 mi.E. Gujranwala, 11.ii.1970 from *Grevillea robusta*. Exemplary deposited in U.S.N.M.

5. *Amblydromella ornatulus*, new species

(Fig. 4)

Female. Dorsal shield reticulated, 306μ long, 160μ wide, deeply concave near *S2*, 18 pairs of setae, most of them slightly recurved (Fig. 4A). Chelicera 24μ long with 4 subapical teeth on fixed digit and 2 subapical teeth on movable

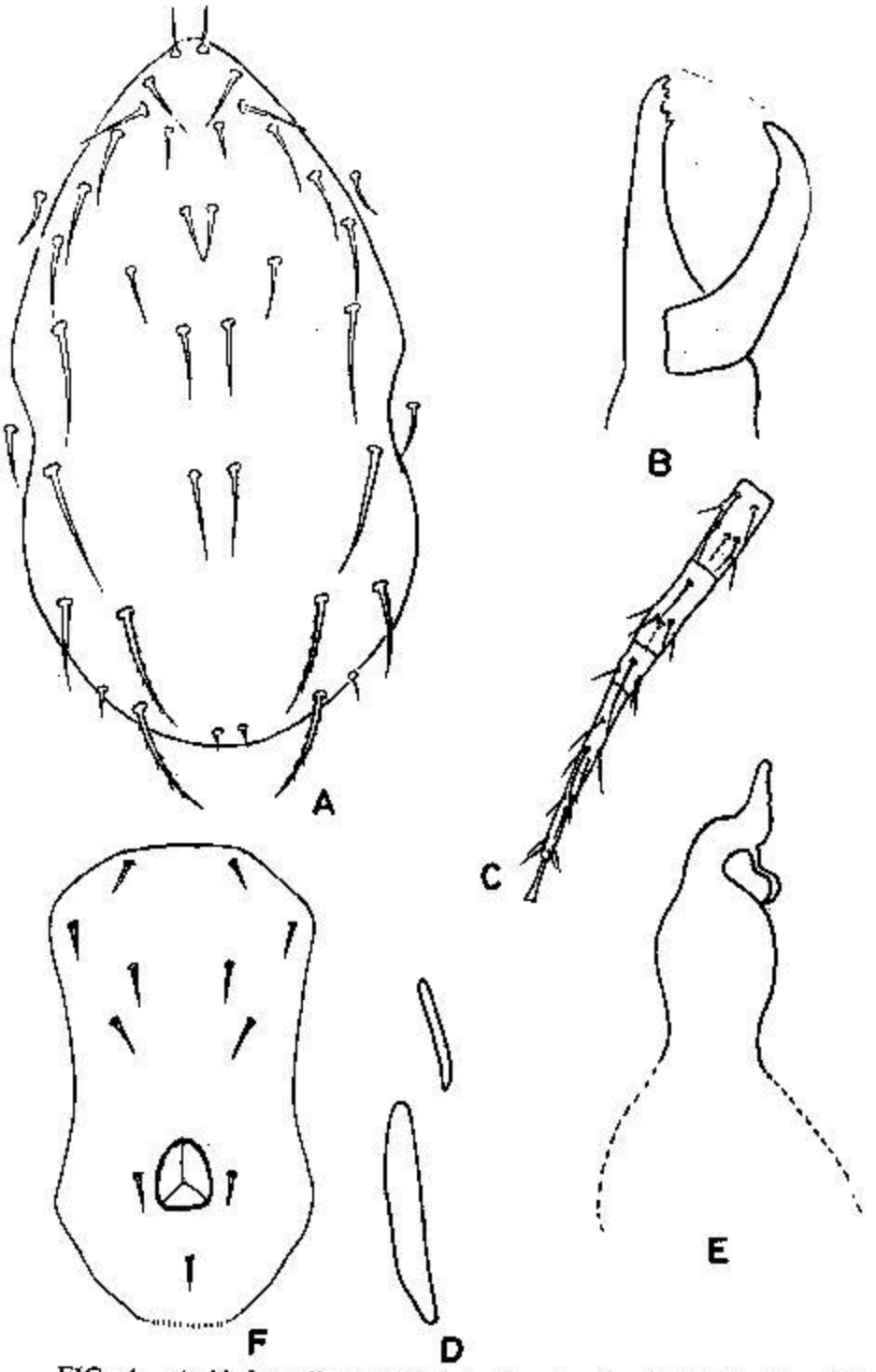

FIG. 4. *Amblydromella ornatulus*, n.sp., A, dorsal shield; B, chelicera; C, leg IV; D, metapodal platelets; E, spermatheca; F, ventrianal shield.

digit (Fig. 4B). All setae simple and stout except *L*10 and *M*2 weakly serrate. Dorsal setae: *V* 22μ; *D*1 = *D*2 = 24μ, *D*3 34μ, *D*4 37μ; *Cl* 10μ; *L*1 32μ, *L*2 24μ, *L*3 31μ, *L*4 34μ, *L*5 37μ, *L*6 44μ, *L*7 55μ, *L*8 51μ, *L*9 10μ, *L*10 51μ; *M*1 26μ, *M*2 57μ; *S*1 = *S*2 = 27μ. Setae *L*1, *L*4 longer than distance of seta next in line; *L*5 just reaches base of *L*6 (Fig. 4A). Peritreme extending forward to base of vertical seta *V*. Sternal shield with 3 pairs of setae. Metasternal setae on separate platelets. Genital shield 71μ wide, wider than ventrianal shield. Ventrianal shield 102μ long, 58μ wide with 4 pairs of preanal setae and a pair of pores (Fig. 4F). Membrane surrounding ventrianal shield with 4 pairs of setae and 4 pairs of visible pores. Metapodal platelets, 2 pairs, primary 27μ and secondary 10μ long (Fig. 4D). Spermathecal atrium hammer-like and 5μ long, cervix bell-shaped and 17μ long (Fig. 4E). Leg IV basitarsus macroseta 31μ in length (Fig. 4C).

Male: Not known.

Type: Holotype female, collected U.A.L. Campus, 10.x.1968 (Wali M. Chaudhri) from malformed inflorescence of *Mangifera indica*, and deposited in the Department of Entomology, U.A.L. One female, collected 2 mi.N. Jhang, 22.xii.1969 from *Amarantus viridis*; 1 female, collected Canal Bank, Sahiwal, 13.vi.1970 from *Erigerson stricta*; 1 female, collected 1 mi.N. Sargodha, 21.x.1972 from *Verbena bonariensis*. Exemplary deposited in U.S.N.M.

Remarks: This taxon is closely related to *Typhlodromus* (*Typhlodromus*) *rhenanus* Chant but the following characters separate them :

1. Dorsal shield concave near *S*2 in this species but not concave in *rhenanus*.

2. Dorsal setae smaller in this species than in *rhenanus*.

3. Ventrianal shield is elongated in this species but it is triangular in *rhenanus*. Length is almost twice the width.

4. Shape of spermatheca differs in both the species.

6. *Amblydromella libitus*, new species

(Fig. 5)

Female. Dorsal shield reticulated 332μ long, 160μ wide, deeply concave near *S*2, bears 18 pairs of setae and 5 pairs of visible pores (Fig. 5A). Chelicera 24μ long, with 4 subapical teeth on fixed digit and 3 subapical teeth on movable

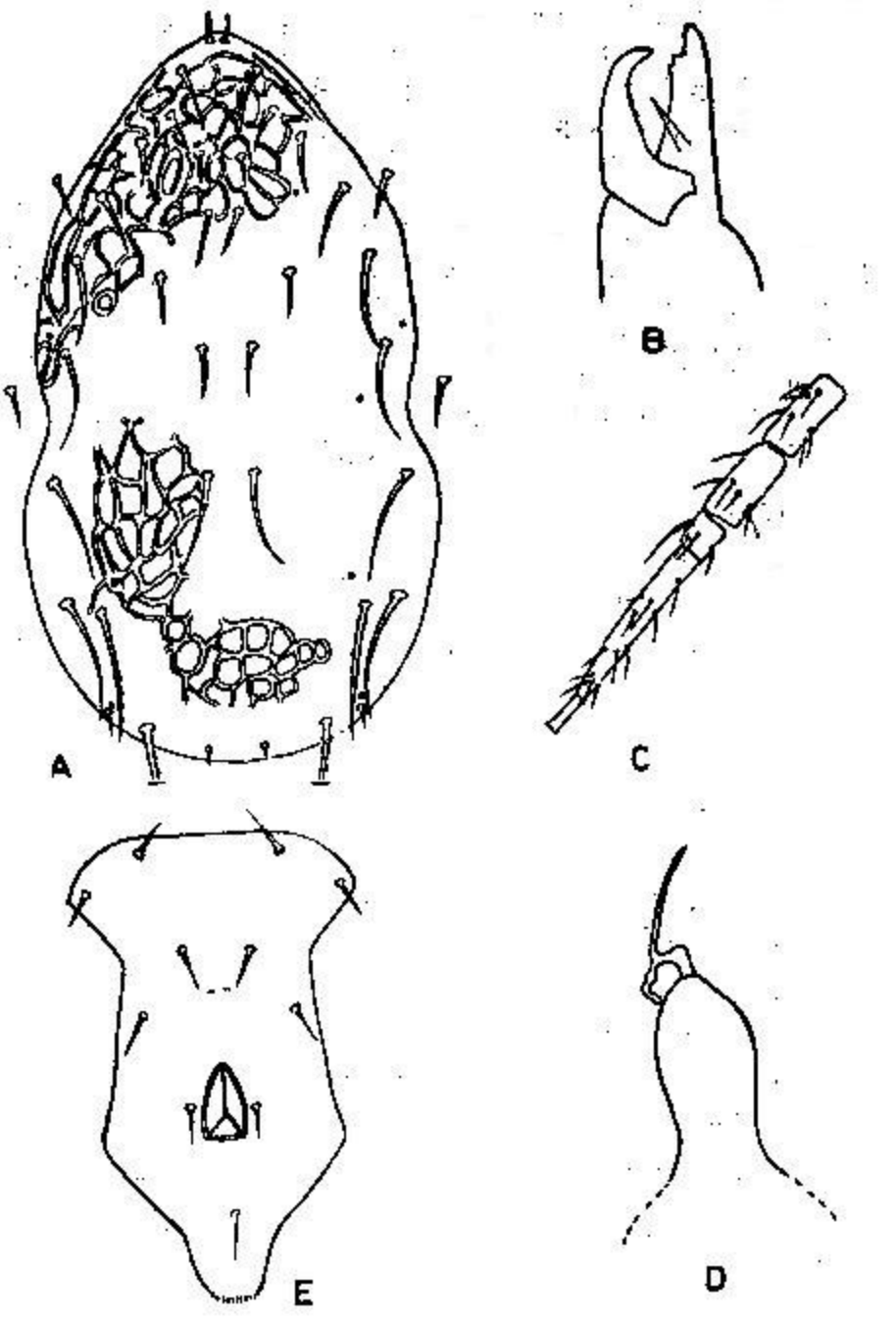

FIG. 5. *Amblydromella libitus*, n.sp., A, dorsal shield; B, chelicera; C, leg IV; D, spermatheca; E, ventrianal shield.

digit (Fig. 5B). All setae simple, somewhat thorn-like except *L*10 and *M*2, serrate. Dorsal setae: *V* 24μ; *D*1 19μ, *D*2 21μ, *D*3 34μ, *D*4 39μ; *Cl* 10μ; *L*1 24μ, *L*2 22μ, *L*3 27μ, *L*4 34μ, *L*5 41μ, *L*6 44μ, *L*7 51μ, *L*8 49μ—51μ, *L*9 8μ, *L*10 58μ; *M*1 22μ, *M*2 54μ; *S*1 24μ and *S*2 27μ. Setae *L*1 and *L*2 longer than distance between *L*1–*L*2 and *L*2–*L*3; *L*3 just reaches base of *L*4; *L*4 just reaches *L*5 and *L*5 just reaches *L*6 (Fig. 5A). Peritreme extending forward to base of seta *V*. Sternal shield with 3 pairs of setae. Metasternal setae on separate platelets. Genital shield 58μ wide. Ventrianal shield, 100μ long, 60μ wide, convex anteriorly, constricted to form waist, with 4 pairs of setae and a pair of pores (Fig. 5E). Membrane surrounding ventrianal shield with 4 pairs of setae and 2 pairs of small pores. Metapodal platelets, 2 pairs, primary and secondary measuring 34μ and 14μ in length, respectively. Spermatheca as in figure 5D. Leg IV basitarsus macroseta, 24μ in length (Fig. 5D).

Male. Not known.

Type. Holotype female, collected U.A.L. Campus, 14.iv.1965 (Wali M. Chaudhri) from *Triticum aestivum* straw, and deposited in the Department of Entomology, U.A.L. One female, collected 3 mi.N.Jhang, 22.xii.1969 from *Kochia indica*; 1 female, collected ShoreKot Road Forests, 9.viii.1970 from *Aster* sp., 1 female, collected 3 mi.E. Khanewal, 3.vi.1972 from *Ipomoea batatas*. Exemplary deposited in U.S.N.M.

Remarks. This species resembles *Amblydromella ornatulus*, n.sp. However, the following characters separate them :

1. Movable digit of chelicera with 3 subapical teeth in this species as against 2 in *ornatulus*.

2. Dorsal shield is heavily sclerotized in this species as compared to unsclerotized in *ornatulus*.

3. Five pairs of visible pores on dorsal shield in this species as against none in *ornatulus*.

4. Shape of ventrianal shield differs in both the species.

5. Dorsal setae *L*3, *L*4 just reach base of setae next in line in this species but are longer in respective distances in *ornatulus*.

DISCUSSION

Five new species of predatory mites belonging to the genus *Amblydromella*

have been collected from Pakistan and described in this paper. *Typhlodromus zafari* Chaudhri has also been transferred to this genus.

These new species have been separated from other species of this genus on the basis of certain characters discussed under each species. The phenetic similarities of these species have also been taken into consideration and are discussed below :

In this genus *libitus* and *ornatulus* show phenetic similarity at the same level at which *incasus* and *maracus* (81 %). If the characters were affected due to the environmental factors, then *maracus* and *ornatulus* should have shared more features with each other than they have shared with *incasus* and *libitus*, respectively. Species *zafari* shows 50% similarity with *libitus* and *ornatulus*. The lowest phenetic similarity of *serratus* to all the other species should be attributed to the divergence of various characteristics, because of its isolated habitat i.e., forest area (Tables I, II, Fig. 6).

ACKNOWLEDGEMENTS

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TABLE I. *Comparison of characters in species taxa of Genus AMBLYDROMELLA Muma*

CHARACTERS	*serratus* n.sp.	*incasus* n.sp.	*maracus* n.sp.	*zafari* Chaudhri	*ornatulus* n.sp.	*libitus* n.sp.
1. Body reticulated	+	—	+	+	+	+
2. Pores on dorsal shield, present	+	+	—	+	—	+
3. Seta *D*4 serrate	+	—	—	—	—	—
4. Seta *M*2 serrate, pointed	+	+	+	—	+	+
5. Seta *L*10 serrate, pointed	+	—	—	+	+	+
6. Setae *S*1, *S*2 equal in length	—	—	—	+	+	—
7. Peritreme with straight end	—	—	—	+	+	+
8. Sternal shield setae, 3 pairs	—	+	+	+	+	+
9. Shape of ventrianal shield	+	—	—	—	—	—
10. Seta *VL*1 serrate, pointed	+	—	—	+	+	+

11. Pores present on membrane surrounding ventrianal shield	+	+	—	—	+	+
12. Shape of spermatheca	+	—	—	—	—	—
13. Leg IV with 3 macrosetae	—	—	—	+	—	—
14. Leg IV setae knobbed	+	+	+	+	—	—
15. Cheliceral movable digit with 2 teeth	+	—	—	—	+	—
16. Cheliceral fixed digit with 4 teeth	+	—	—	—	+	+

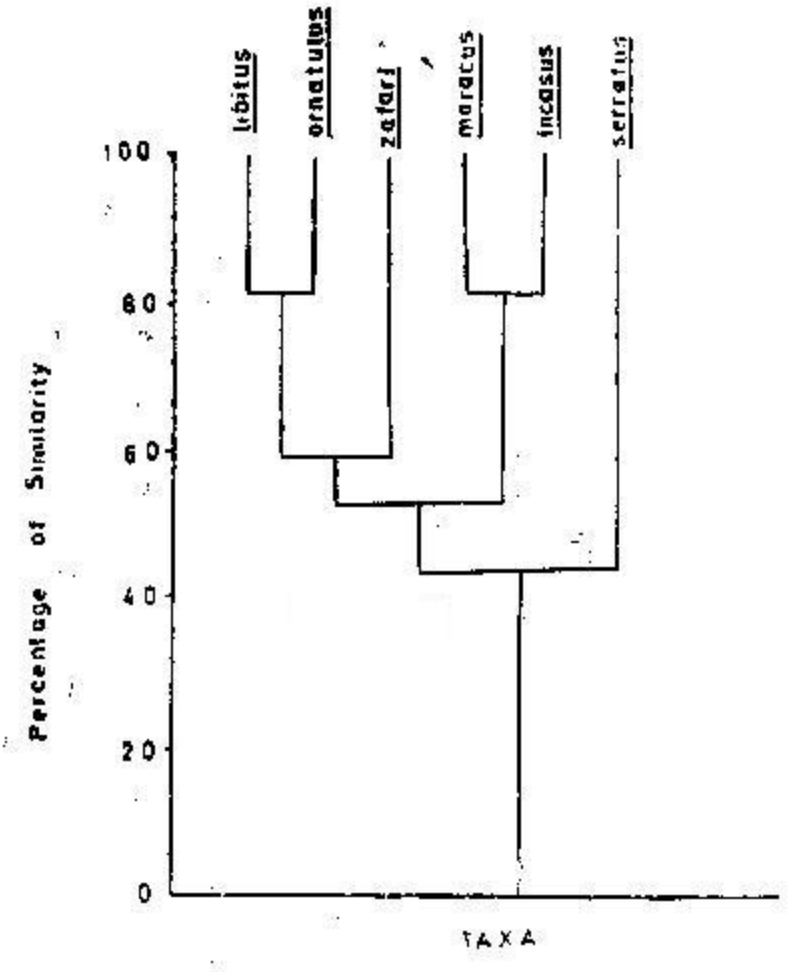

Fig 6 Phenogram of Species of Genus Amblydromella

Table II: Showing similarity matrix in species taxa of Genus Amblydromella Muma

	serratus n.sp.	incasus n.sp.	maracus n.sp	zafari Chaudhri	ornatulus n.sp	libitus n.sp.
serratus n.sp						
incasus n.sp.	44 %					
maracus n.sp.	38 %	81 %				
zafari Chaudhri	31 %	50%	56 %			
ornatulus n.sp	50 %	44 %	50 %	56 %		
libitus n.sp	56 %	63 %	56 %	63 %	81 %	

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