FAUNA OF RAJASTHAN, INDIA, PART II

CRUSTACEA : CLADOCERA

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(With 2 Tables and 14 Text-figures)

CONTENTS

I—INTRODUCTION

(1) *General*

The present work is mostly devoted to the Cladocera collections from Rajasthan made by the Zoological Survey of India parties during the years 1957-61.

Our earlier knowledge on the Cladocera fauna of Rajasthan was almost scanty, and even of India as a whole, meagre. After the papers of Gurney (1906, 1907), Brehm (1936, 1950, 1953) and Sewell (1935), there are no important works worth mentioning. Gurney's work is mostly concerned with Lower Bengal and Chota Nagpur. Brehm recorded some Cladocera from different parts of India, *viz.*, Kashmir, Punjab, Saurashtra, etc., and Sewell's work is confined to the Cladocera of Bengal only. Recently, I have described two species from Rajasthan, *viz.*, *Latona tiwarii* Biswas (1964) and *Chydorus brehmi* Biswas (1965).

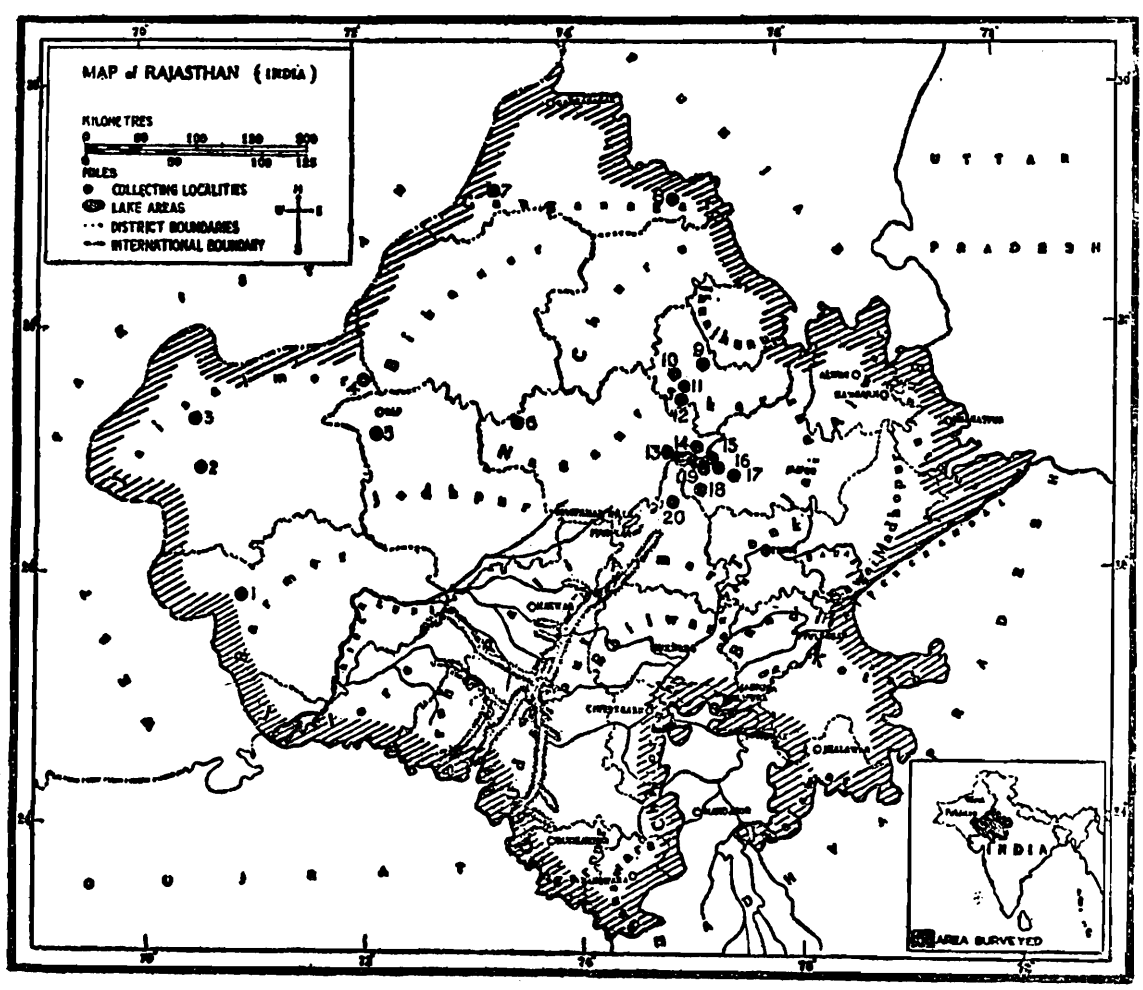
This report is based on the collections made mostly from the Sambhar Lake Survey (November, 1957 to January, 1959) and two Rajasthan Desert Surveys undertaken by Dr. B. Biswas and Western Rajasthan

Rec. zool. Surv. India, 63 (1-4) 1971.

Survey by Dr. K. K. Tiwari and myself (1957-58). Freshwater collections were also made in Jaipur and Nagaur Districts during the Sambhar Lake Survey. Dr. Tiwari's collections were made mainly from the Barmer, Jaisalmer and Jodhpur Districts, while those by Dr. Biswas come from the districts of Bikaner, Ganganagar, Jaipur, Nagaur and Sikar.

On the basis of the ecological characteristics, the collections from Rajasthan, can be broadly divided into the freshwater and the brackish-water collections. The former were obtained from tanks, ditches, canals, reservoirs, etc., and the latter mostly from the Sambhar Lake. In the rainy season, or just after that, the water of the Sambhar Lake approaches freshwater conditions and therefore, some freshwater species also make their appearance in that Lake. For a general account of Rajasthan, Part 1 of this series (Roonwal, 1967) may be consulted.

All the species, except *Daphnia carinata* King, recorded in this paper are new records for Rajasthan though some of them have been recorded by the above mentioned earlier authors from other parts of India. Out of the 45 species and varieties recorded here from Rajasthan, 26 are new to India.



TEXT-FIG. 1.—Map of Rajasthan, showing collecting localities for Cladocera (Crustacea)

1. Bhap tank (Barmer Dist.). 2. Gadisar. 3. Biprasar. 4. Nokh (Jaisalmer Dist.). 5. Phalodi. 6. Gurha (Jodhpur Dist.). 7. Suratgarh. 8. Diplana (Ganganagar Dist.). 9. Gunjara. 10. Molasi. 11. Puranchhoti. 12. Kanwarpura (Sikar Dist.). 13. Nawa or Kuchaman Road. 14. Gudha (Nagaur Dist.). 15. Sambhar Lake Town. 16. Phulera. 17. Asalpura Bund. 18. Dudu. 19. Julga Lake (Jaipur Dist.). 20. Anasagar (Ajmer Dist.).

(2) *List of the Collections Examined*

(Table 1)

The Collections examined are given in Table 1 below.

TABLE 1.—List of surveys from which the material for Rajasthan Cladocera was studied.

Name of the Survey	*Year*	*Leader of Survey Party*	*Districts surveyed*
1. Sambhar Lake Survey	Nov., 1957 to Jan., 1959	A. K. Mukherjee & S. Biswas	Jaipur & Nagaur
2. Rajasthan Desert Survey	1956	Dr. B. Biswas	Nagaur, Pali, Ajmer, Bikaner, Jaipur, Jodhpur, Bikaner, Churu, Ganganagar. Jaisalmer, Nagaur & Sikar
	1957-58	,,	
	1960-61	,,	
3. Western Rajasthan Survey	1957-58	Dr. K. K. Tiwari	Barmer, Jaisalmer & Jodhpur
4. Ajmer Collection	1961	Dr. Tej Singh	Ajmer
5. Rajasthan Survey	1963	K. K. Mahajan	Jaipur

(3) *Acknowledgements*

I am very thankful to the Director, Zoological Survey of India, Calcutta, for providing me with the facilities to work out these collections. It would have been impossible for me to write up this report without his help and guidance. I am also thankful to Dr. K. K. Tiwari for his help.

II—List of Collecting Localities

(Table 2)

Cladocera were collected from a total of 22 collecting stations, distributed over 8 districts of Rajasthan (Table 2).

TABLE 2.—List of the Main Collecting Stations for Cladocera of Rajasthan.

Abbreviation : AKM, A. K. Mukherjee; BB, Dr. B. Biswas; KKM, K. K. Mahajan; KKT, Dr. K. K. Tiwari; SB, S. Biswas; TS, Dr. Tej Singh; *Sta.*, Collecting Station.

Serial No.	*Collecting Station*	*Approx. Latitude (N)*	*Approx. Longitude (E)*	*Name of collector & year of collection*
(1)	(2)	(3)	(4)	(5)
	1. *Ajmer District*			
1.	Anasagar Lake, Ajmer	26°25′	74°35′	TS (1961)
	2. *Barmer District*			
2.	Bhap Tank, *ca.* 18 km. NE. of Barmer	25°51′	71°26′	KKT & SB (1957—58)
	3. *Ganganagar District*			
3.	Diplana, 13 km. E. of Nohar	29°11′	74°53′	BB (1960)
4.	Suratgarh, Sta. 23	29°19′	73°54′	BB (1960)
	4. *Jaipur District*			
5.	Julga Lake *ca.* 21 km. SW. of Gudha	26°	75°	SB (1958—59)
6.	Narayana Village	26°45′	75°10′	SB (1958—59)
7.	Dudu	26°40′	75°10′	SB (1958—59)
8.	Sambhar Lake	26°54′	75°13′	AKM (1958)
9.	Devdyani (temple tank near Sambhar)	26°55′	75°13′	SB (1958—59)
10.	Asalpura Bund	..	..	SB (1958—59)
11.	Phulera	26°52′	75°16′	SB (1958—59) KKM (1963)

(Table 2)—*contd.*

Serial No.	*Collecting Station*	*Approx. Latitude (N)*	*Approx. Longitude (E)*	*Name of collector & year of collection*
(1)	(2)	(3)	(4)	(5)
	5. Jaisalmer District			
12.	Gadisar, Jaisalmer	26°55′	70°57′	KKT & SB (1957—58)
13.	Geodiasar (*ca.* 24 km. S. of Ramgarh)	27°16′	70°32′	KKT & SB (1957—58)
14.	Biprasar (*ca.* 80 km. S. of Ramgarh)	27°18′	70°30′	KKT & SB (1957—58)
15.	Nokh Village	27°33′	72°15′	BB (1960)
	6. Jodhpur District			
16.	Phalodi	27°09′	72°24′	KKT & SB 1957—58)
	7. Nagaur District			
17.	Gudha (on Sambhar Lake)	26°55′	75°25′	BB (1956—57) SB (1958—59) AKM (1957—58)
18.	Nawa (on Sambhar Lake)	27°00′	75°00′	SB (1958—59)
19.	Kuchaman Road (close to Nawa)	27°00′	75°00′	SB (1958—59)
20.	Gurha (*ca.* 26 km. W. of Nagaur)	27°13′	73°29′	BB (1960)
	8. Sikar District			
21.	Molasi (16 km. W. of Sikar)	27°36′	75°00′	BB (1960)
22.	3 km. W. of Gunjara	27°40′	75°16′	BB (1960)
23.	1.62 km. E. of Kanwarpura	27°36′	75°05′	BB (1960)
24.	1 Puran Chhoti (15 km. SSW. of Sikar)	27°31′	75°05′	BB (1960)

III—List of Species of Cladocera Known from Rajasthan

A total of 45 species and varieties of Cladocera are known from Rajasthan and are listed below ; they belong to four families, *viz.*, Sididae, Daphnidae, Macrothricidae and Chydoridae.

Class **CRUSTACEA**
Superorder DIPLOSTRACA
Order I. CLADOCERA
Suborder (A) *EUCLADOCERA*
Superfamily (a) Sidoidea
Family (1) Sididae

1. *Latona tiwarii* Biswas
2. *Diaphanosoma excisum* Sars
3. *D. excisum* Sars var. *stingelini* Jenkin
4. *D. excisum* Sars var. *longiremis* Ekman
5. *D. sarsii* Richard
6. *Latonopsis occidentalis* Birge
7. *L. australis* Sars
8. *Pseudosida szalayi* Daday

Superfamily (b) Chydoroidea
Family (2) Daphnidae

9. *Daphnia lumholtzi* Sars
10. *D. carinata* King
11. *D. hyalina* Leydig
12. *Simocephalus australiensis* (Dana)
13. *S. elizabethae* (King)
14. *S. vetulus* (O.F. Müller)
15. *S. latirostris* Stingelin
16. *Scapholeberis kingi* Sars
17. *Ceriodaphnia rigaudi* Richard
18. *C. reticulata* (Jurine) var. *kurzii* Stingelin
19. *C. reticulata* (Jurine) var. *serrata* Sars
20. *C. laticaudata* P. E. Müller
21. *Moina dubia* Guerne & Richard
22. *M. brachiata* (Jurine)
23. *M. rectirostris* (Leydig)
24. *Monia banffyi* Daday
25. *M. macrocopa* (Straus)

Family (3) Macrothricidae

26. *Streblocerus serricaudatus* (Fischer)
27. *Macrothrix spinosa* King
28. *M. triserialis* Brady
29. *M. chevreuxi* Guerne & Richard
30. *Gurneyella odiosa* (Gurney)
31. *Ilyocryptus halyi* rady

Family (4) Chydoridae

32. *Leydigia laevis* Gurney
33. *L. acanthocercoides* (Fischer)

34. *Alona rectangula* Sars
35. *A. bukobensis* Welthner
36. *A. intermedia* Sars var. *minor* Stingelin
37. *A. camboui* Guerne & Richard
38. *A. glabra* Sars
39. *Pleuroxus aduncus* (Jurine)
40. *Dunhevedia crassa* King
41. *Chydorus robustus* Stingelin
42. *C. denticulatus* Henry
43. *C. reticulatus* Daday
44. *C. ventricosus* Daday
45. *C. brehmi* Biswas

IV—KEY TO THE SPECIES OF RAJASTHAN CLADOCERA

1(112). Body and feet covered by a bivalve shell. Feet in general foliaceous, not plainly jointed	Suborder (A)*EUCLADOCERA*
2(21). Six pairs of feet, all similar except the last ; all foliaceous	Superfamily (a) SIDOIDEA
3(20). Shell of ordinary type. Antennae biramus in female ; rami flattened, the dorsal with numerous setae both lateral and terminal .	Fam. (i) SIDIDAE
4(5). Dorsal ramus of antenna 3-jointed .	Genus (1) *Sida* Straus
Rostrum present .	1. *Sida crystallina** (O. F. Müller)
5(4). Dorsal ramus of antenna 2-jointed.	
6(7). With foliaceous appendix from the ventral side of head	Genus (2) *Latona* Straus
Without lateral expansion of antenna . . .	2. *Latona tiwarii* Biswas
7(6). Without foliaceous appendix.	
8(15). Without spines on postabdomen	Genus (3) *Diaphanosoma* Fischer
9(14). Shell duplicator narrow.	
10(13). Reflex antenna not exceeding posterior margin of shell.	
11(12). Reflex antenna not more than one-third of body-length	3. *Diaphanosoma excisum* Sars
12(11). Reflex antenna nearly reaches posterior border of shell	4. *Diaphanosoma excisum* var. *stingelini* Jenkin

*Not recorded from Rajasthan. Found in Assam only.

13(10), Reflex antenna exceeding posterior margin of shell . . . . . 5. *Diaphanosoma excisum* var. *longiremis* Ekman

14(9). Shell duplicator broad, more than 10 spines on margin of shell . . . . . 6. *Diaphanosoma sarsii* Richard

15(8). Spines on postabdomen.

16(19). Eyes dorsal, far from insertion of antennule and optic ganglion. Without rostrum . . Genus (4) *Latonopsis* Sars

17(18). With fornix ; antennule longer than anterior margin of head 7. *Latonopsis occidentalis* Birge

18(17). Without fornix ; antennule shorter than anterior margin of head . . 8. *Latonopsis australis* Sars

19(16). Eye ventral or in middle of head ; rostrum present . . . Genus (5) *Pseudosida* Herrick

A median projection present on dorsal side near apex of postabdomen . 9. *Pseudosida szalayi* Daday

20(3). Body enclosed in a gelatinous mantle. Antennae simple in female ; cylindrical with 3 terminal setae . . . Fam. (ii) HOLOPEDIDAE

21(2). Five or six pairs of feet ; first and second pairs more or less prehensile, others foliaceous Superfamily (b) CHYDOROIDEA

22(80). Antennules attached to ventral side of head and not covered by fornices.

23(62,63). Antennules of female usually small, sometimes rudimentary ; if large, never inserted at anterior end of ventral surface of head. Dorsal ramus of antenna 4-jointed, ventral 3-jointed. Intestine simple, with 2 hepatic caeca Fam. (iii) DAPHNIDAE

24(42). Rostrum present.

25(32). No cervical sinus. Valves with polygonal, usually rhomboidal, marking and with posterior spines. Crest on dorsal side of head Genus (6) *Daphnia* O. F. Müller

26(29). Claws with pecten.

27(28). Head helmeted and often produced into spine 10. *Daphnia lumholtzi* Sars

28(27). Head not helmeted. Rostrum and antennule *pulex*-like but front not sinuate. Head carinated. Postabdomen tapered and not sinuate. 11. *Daphnia carinata* King

9(26). Claws without pecten.

30(31). Adult with no crest or at most rudimentary crest on head ; rostrum of characteristic form ; shell reticulation more or less well marked . . . . . 12. *Daphnia longispina* (O. F. Müller)

31(30). Adult with definite crest ; rostrum not like *longispina* ; reticulation less marked 13. *Daphnia hyalina* Leydig

32(25). Cervical sinus present. No crest.

33(40). Valves transversely striated. Postabdomen broad, with indentation in which anus opens Genus (7). *Simocephalus* Schoedler

34(39). Vertex rounded, smooth. No posterior spine.

35(36). Ocellus punctiform. Posterior prominence obtuse . . . . . 14. *Simocephalus australiensis* (Dana)

36(35). Ocellus elongated.

37(38). Body nearly symmetrical. Posterior prominence not very prominent . . 15. *Simocephalus vetulus* (O. F. Müller)

38(37). Body not symmetrical. Posterior prominence very prominent . . . 16. *Simocephalus elizabethae* (King)

39(34). Vertex angulate. Blunt posterior spine or prominence present . . . 17. *Simocephalus latirostris* Stinelin

40(33). Valves obscurely reticulated and with some striae. Posterior and ventral margin straight, the latter extended into a spine Genus (8) *Scapholeberis* Schoedler

41(40). Colour usually dark. Infero-posteal angle with a spine, often long . 18. *Scapholeberis kingi* Sars

42(24). Rostrum absent ; cervical sinus present.

43(50). Head small and depressed. Antennules small. Valves oval and rounded. No postanal extension of postabdomen. . . . . Genus (9) *Ceriodaphnia* Dana.

44(49). Postabdomen of ordinary form.

45(46). Head with a short spine or horn in front of antennule 19. *Ceriodaphnia rigaudi* Richard

46(45). Head without spine. Claws pectinate 20. *Ceriodaphnia reticulata* (Jurine)

47(A). Shell not reticulated ; fornix rounded . 21. *Ceriodaphnia reticulata* var. *kurzi* Stingelin

48(B). Shell reticulated ; fornix extended . . . 22. *Ceriodaphnia reticulata* var. *serrata* Sars

49(44). Postabdomen very broad, obliquely truncate . 23. *Ceriodaphnia laticaudata* P. E. Müller

50(43). Head large and usually extended. Antennules large and freely movable. Postabdomen with postanal extension.

51(50). Body thick and large. Valves somewhat rhomboidal, not wholly covering the body. Fornix small. Ocellus absent. Abdominal processes represented by horse-shoeshaped fold — Genus (10) *Moina* Baird

52(60). Postabdominal end-claw with pecten.

53(53). Postanal spine 8 or more. Animal large.

55(57). Two ephippial eggs.

56. Supraocular depression present. Antennules of male with sense seta in the middle. Anal spines without seta . . . — 25. *Moina brachiata* (Jurine)

57(55). One ephippial egg.

58(59). Valves smooth. Ephippium reticulated around edges, smooth in middle. Antennules of male with sense seta near middle. . . . — 26. *Moina rectirostris* (Leydig)

59(58). Valves with striae. Ephippium reticulated all over. Antennules of male with sense seta nearer to base . . . . . — 27. *Moina banffyi* Daday

60(52). End-claw without pecten.

61. No supraocular depression . . . — 28. *Moina macrocopa* (Straus)

62(23,63). Six pairs of feet. Antennules of female large, fixed. Intestine simple, no cacea . . . — Fam. (iv) BOSMINIDAE

63(62). Antennules of female freely movable, usually inserted at anterior end of ventral surface of head. Rami of antennae 3 and 4-jointed. Intestine simple or convoluted; hepatic caeca usually wanting; 5 or 6 pairs of feet.

64(67). Intestine convoluted . . . . . — Fam. (v) MACROTHRICIDAE

65(77). Antennary setae $\frac{0-0-1-3}{1-1-3}$ Animal small and spherical . . . . . — Genus (11) *Streblocerus* Sars

66. Dorsal margin of valves smooth . . . — 29. *Streblocerus serricaudatus* (Fischer)

67(64). Intestine simple.

68(75). Anus not guarded by a pair of flaps.

69. Antennary setae $\frac{0-0-1-3}{1-1-3}$ basal seta of 3-jointed ramus, stout and stiff . . . — Genus (12) *Macrothrix* Baird

70(72). Antennules enlarged near distal end.

71. Postabdomen bilobed Squamous marking on shell . . . . . — 30. *Macrothrix spinosa* King

72(70). Antennules not enlarged near distal end.

73(74). Dorsal appendages of lip-plate bilobed and hairy — 31. *Macrothrix chevreuxi* Guerne & Richard

74(73). Dorsal appendages of lip-plate not bilobed and not hairy — 32. *Macrothrix triserialis* Brady

75(68). Anus guarded by a pair of flap-like structures — Genus (13) *Gurneyella* Brehm

76. Body outline oval. Postabdominal sides covered with numerous setae groups. Anal declivity 3-pointed. Antennules always with 3 spines — 33. *Gurneyella odiosa* (Gurney)

77(65). Antennary setae $\frac{0-0-0-3}{1-1-3}$

78. Vertex of head forming sharp angle in front of insertion of antennules Dorsal crest of the valves absent or small. Postabdomen very large, with numerous long spines . — Genus 14. *Ilyocryptus* Sars

79. Antennae less massive and long. Preanal spine 6-7 in number. Front angulate . — 34. *Ilyocryptus halyi* Brady

80(22). Fornices extended so as to cover antennules in whole or in part and united with rostrum into a beak, projecting ventrally in front of antennules. . . . . — Fam. (vi) CHYDORIDAE

81. Anus on dorsal side of postabdomen, with the postanal portion bearing denticles. Without hepatic caeca. Two summer eggs ; one ephippial egg. Male with strong hook on first leg . — Subfamily (a) CHYDORINAE

82(98). Posterior margin of valves not greatly less than maximum height.

83(85). Postabdomen with marginal and lateral denticles.

84(88). Postabdomen relatively long and narrow ; marginal denticles numerous, longer distally. Basal spine stout and long.

85(83). Postabdomen with numerous clusters of large spines . . . . . — Genus (15) *Leydigia* Kurz

86(87). Valves without marking . . — 35. *Leydigia laevis* Gurney

87(86). Valves straited longitudinally . . . . — 36. *Leydigia acanthocercoides* (Fischer)

88(84). Postabdomen not noticeably narrow ; distal denticles not conspicuously larger. Basal spine small.

89. Valves with longitudinal striae. . . . . — Genus (16) *Alona* Baird

90(95). Infraposteal angle of postabdomen rounded.

91(97). Lateral fascicles long, extending beyond dorsal margin. . . . . — 37. *Alona rectangula* Sars

92(93). Postabdomen not broadened towards apex . — 38. *Alona bukobensis* Welthner

93(92). Postabdomen broader towards the apex. Shell with longitudinal striae . . . . — 39. *Alona intermedia* Sars

4. Shell plain . . . . . — 40. *Alona intermedia* var. *minor* Stingelin

95(90). Infraposteal angle of postabdomen not rounded.	
96(97). Lateral fasicle extending beyond dorsal margin	41. *Alona cambouei* Guerne & Richard
97(96). Lateral fasicle not extending beyond dorsal margin .	42. *Alona glabra* Sars
98(82). Posterior margin of valves considerably less than maximum height.	
99(104). Body elongated, form not spherical.	
100(102). Rostrum long . .	Genus (17) *Pleuroxus* Baird
101. Angle of postabdomen rounded. Row of marginal denticles equal to anal emargination.	43. *Pleuroxus aduncus* (Jurine)
102(100). Rostrum short . .	Genus (18) *Dunhevedia* King
103. Body short and high, dorsal margin much arched	44. *Dunhevedia crassa* Kin
104(99). Body spherical and broadly ellipsoidal. Postabdomen ordinarily short, with prominent preanal angle .	Genus (19) *Chydorus* Leach
105(106). Shape of body arched prominently, binder part drawn outward, posterior margin straight.	45. *Chydorus ventricosus* Daday
106(105). Shape of body normal.	
107(108). Dorsal edge of valve with "chitin schlub" or tubercles . .	46. *Chydorus robustus* Stingelin
108(107). Edge of valve normal-shaped.	
109(110). Shape of lip-plate obtuse . .	47. *Chydorus denticulatus* Henry
110(109, 111). Shape of lip-plate acuminate	48. *Chydorus reticulatus* Daday
111(110). Shape of lip-plate button or nipple-shaped.	49. *Chydorus brehmi* Biswas
112(1). Body and feet not covered by shell. Feet subcylindrical; six pairs of feet cylindrical, first pair long, without branchial appendages.	Suborder(B) *HOPLOPODA*

V—Systematic Account

Family (1) Sididae

1. Latona tiwarii Biswas

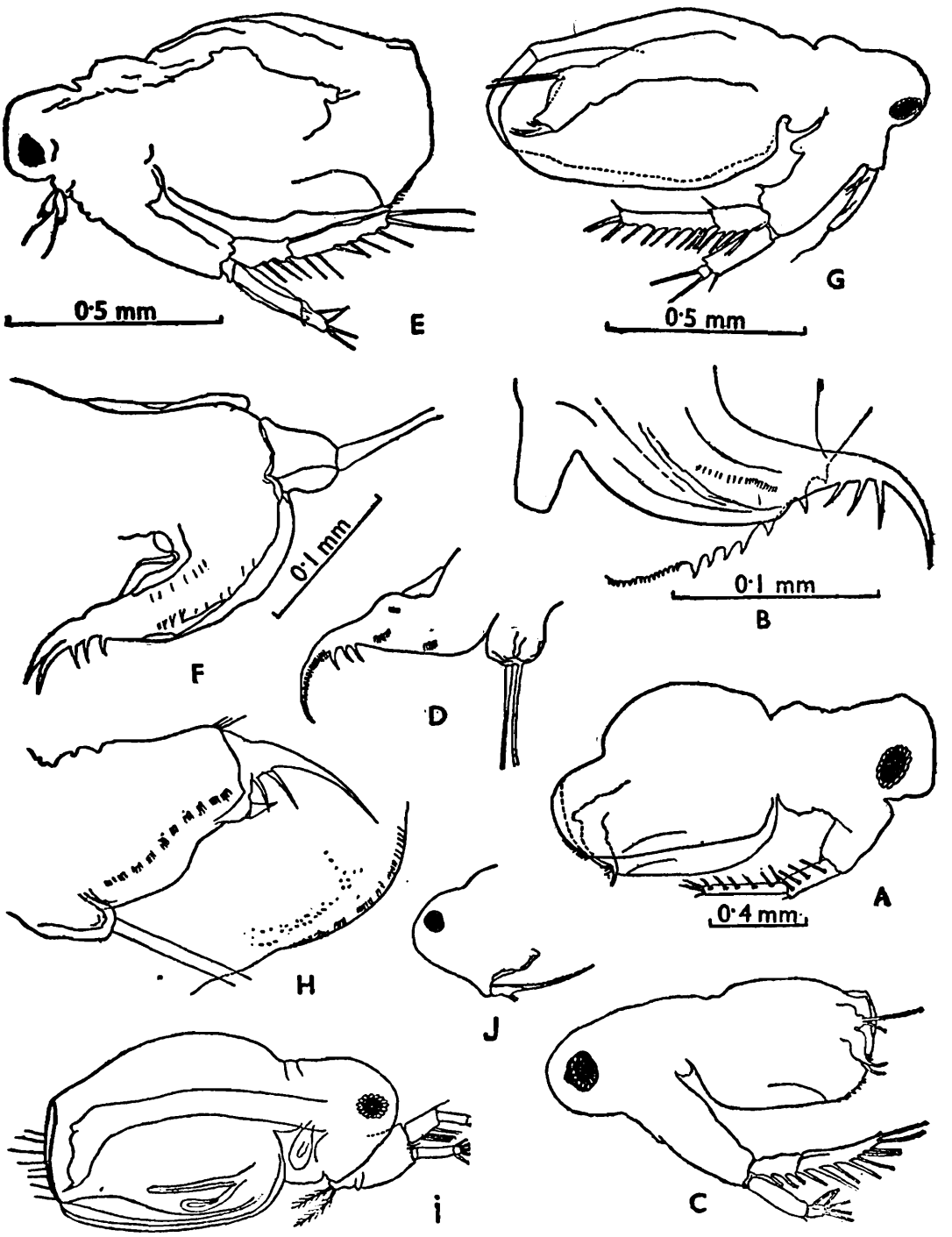
1964. *Latona tiwarii* Biswas, *Proc. zool. Soc.*, Calcutta, 17(2), pp. 140-152, figs. 1 & 2.

Material.—Nagaur Dist. : 4 exs., a ditch adjacent to main lake, Gudha, on Sambhar Lake, 17.ix.58. *Jaisalmer Dist.* : 15 exs., Nokh, 27. viii.60, (All Coll. *B. Biswas*).

Measurement.—Length 1·50 mm.

Distribution.—Rajasthan : As above (first record from the area and for India).

Remarks.—The present species can be separated from the other two species of the genus, *L. setifer* (O. F. Müller) and *L. parviremis* Birge by the absence of antennary expansion and presence of spinules on the end-claw of the postabdomen.



TEXT-FIG. 2.—Cladocera from Rajasthan

(A) *Diaphanosoma excisum* Sars, ♀, in lateral view. (B) Same, post-abdomen lying below inferoposteal corner of carapace. (C) *Diaphanosoma excisum* Sars var. *stingelini* Jenkin, ♀, in lateral view. (D) Same, postabdomen. (E) *Diaphanosoma sarsii* Richard, ♀, in lateral view. (F) Same, postabdomen. (G) *Pseudosida Szalayi* Daday, ♀, lateral view. (H) Same, postabdomen. (I) *Latonopsis occidentalis* Birge, ♀, lateral view. (J) Same, ♂, anterior part.

Magnifications : (A), (I), to same scale. (E), (C), to same scale. (G), (H), (J), to same scale.

2. **Diaphanosoma excisum** Sars

(Text-figs. 2A,B)

1885. *Diaphanosoma excisum* Sars, *Forh. vid. Selsk.*, Christiania, No. 8, pp. 13-18, pl. 2, figs. 1-3.

1895. *Diaphanosoma excisum :* Richard, *Ann. Sci. nat.*, Paris, 18, pp. 367-369, pl. 16, fig. 9.

Material.—Jaipur Dist. : 2 exs., Julga Lake, 21 km. S.W. of Gudha, 24.xi.58, (Coll. *S. Biswas*).

Measurement.—Length 1·12 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere* : Australia.

Remarks.—This species can be easily recognised from allied species by its shorter antennae and the absence of hairs on the sides of postabdomen ; the body is more robust and the supero-posteal angles are markedly deflected.

3. **Diaphanosoma excisum** Sars var. **stingelini** Jenkin

(Text-figs. 2C, D)

1904. *Diaphanosoma excisum* var., Stingelin, *Zool. Jb.* (*Syst.*), Jena, 21, p. 50, pl. 8, figs. 19, 20.

1934. *Diaphanosoma excisum* var. *stingelini* Jenkin, *Ann. Mag. nat. Hist.*, London, (10) 13, pp. 140-143, figs. 1, 1a.

Material.—Jaipur Dist. : 1 ex., Kalo Talao, Narayana, 1.xi.58 ; 20 exs., Julga Lake, 21 km. S.W., of Gudha, 24.xi.58, (All Coll. *S. Biswas*).

Measurement.—Length 1·01 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere* : Sumatra and Africa (Egypt and Uganda).

Remarks.—The variety differs from var. *longiremis* Ekman (see infra) in having a shorter antenna which never exceeds in length the posterior border of the carapace.

4. **Diaphanosoma excisum** Sars var. **longiremis** Ekman

1904. *Diaphanosoma excisum* var. *longiremis* Ekman, *Jagerskiold Expedi.*, Uppsala, 26, (i)(8), pp. 1-2, figs. 2, 3.

1935. *Diaphanosoma excisum* var. *longiremis :* Sewell, *Int. Revue. ges. Hydr. U. Hydr.*, Leipzig, 31 (3-4), p. 210.

Material.—Ajmer Dist. : 15 exs., Anasagar Lake near Ajmer, 20.xi.61, (Coll. *Tej Singh*). *Jaipur Dist.* : 8 exs., Dudu Talao, Dudu, 8.i.59, (Coll. *S. Biswas*).

Measurement.—Length 0·90 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere* : West Bengal (India). Also Sumatra and Africa (Sudan, Egypt).

Remarks.—This variety agrees with var. *stingelini* Jenkin in the presence of hairs at the sides of the postabdomen and with the type in the number of setae on the carapace border, but differs from both in the greater length of the antennae which surpass the posterior border of the carapace.

5. **Diaphanosoma sarsii** Richard

(Text-figs. 2E, F)

1895. *Diaphanosoma sarsii* Richard, *Ann. Sci. na.*, Paris, (7) 18, pp. 365-367, pl. 15, figs. 1 and 8.

1901. *Diaphanosoma sarsii* : Sars, *Arch. Math. Naturu.*, Christiania, 25, pp. 10-13, pl. 2, figs. 1-10.

Material.—Jaipur Dist. : 1 ex., canal water, Dhobola Talao, Narayana, 29.x.58, (Coll. *S. Biswas*). 12 exs., Narayana Talao, Narayana, 2.xi.58, (Coll. *S. Biswas*). *Ganganagar Dist.* : 2 exs., Suratgarh, Sta. 23, 9.x.60, (Coll. *B. Biswas*).

Measurement.—Length 1·17 mm.

Distribution.—Rajasthan : As above (first record). *Elsewhere* : India : Chota Nagpur. Also from Ceylon, S.E. Asia (Sumatra, Java, Celebes, Singapore and Bangkok), Africa and S. America.

Remarks.—The species differs from the nearest one, *D. excisum* Sars and its varieties, mainly by the greater breadth of the shell-duplicator and more spines at its inferoposteal corner.

6. **Latonopsis occidentalis** Birge

(Text-figs. 2I, J)

1892. *Latonopsis occidentalis* Birge, *Trans. Wis. Acad.*, Madison, 8, pp. 383-388, pl. 13, figs. 1-5.

1895. *Latonopsis occidentalis* : Richard, *Ann. Sci. nat.* (*Zool.*), Paris, (7) 18, pp. 380, 381, pl. 16, fig. 12.

Material.—Jaipur Dist. : 3♂♂, 2♀♀, Pumping enclosure, Gudha *kyār*, Sambhar Lake, 11.x.58. 11 exs., from a cemented tank, Gudha *kyār*, 5.ix.58, (All Coll. *S. Biswas*).

Measurements.—Length ♀ 0·78, ♂ 0·65 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere* : North and South America.

Remarks.—The distinguishing characters by which this species differs from *L. australis* Sars are : a small and bilobed fornix ; and the antennule longer than the ventral margin of head.

7. Latonopsis australis Sars

(Text-figs. 8A-C)

1888. *Latonopsis australis* Sars, *Forh. vid. Selsk.*, Christiania, No. 7, p. 6-15, pl. 1, figs. 1-6.

1895. *Latonopsis australis :* Richard, *Ann. Sci. nat. (Zool.)*, Paris, (7) 18, pp. 378-380, pl. 16, figs. 11, 13 and 20.

Material.—Jaipur Dist. : 15 exs., from a cemented tank at Gudha *kyār*, Sambhar Lake, 15.x.58, (Coll. *S. Biswas*).

Measurement.—Length 1·42 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere :* Australia and Europe (Yugoslavia).

Remarks.—The present species is distinguished from closely allied species by its antennule being shorter than the ventral margin of head and the absence of the fornix.

8. Pseudosida szalayi Daday

(Text-fig. 2G-H)

1898. *Pseudosida szalayi* Daday, *Termes. Füzetek.*, Budapest, 21, pp. 64-66, figs. 33*a-d*.

1904. *Pseudosida szalayi :* Stingelin, *Zool. Jb. (Syst)*., Jena, 21, pp. 327-370, pl. 11, figs. 1 and 2.

Material.—Jaipur Dist. : 1 ex., canal water of Dhobola Talao, Sta. Narayana, 29.x.58, (Coll. *S. Biswas*).

Measurement.—Length 1·17 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere :* India : South India. Also from Ceylon, Thailand and Sumatra.

Remarks.—The characteristic of this species is a median projection on the dorsal side near the apex of the postabdomen.

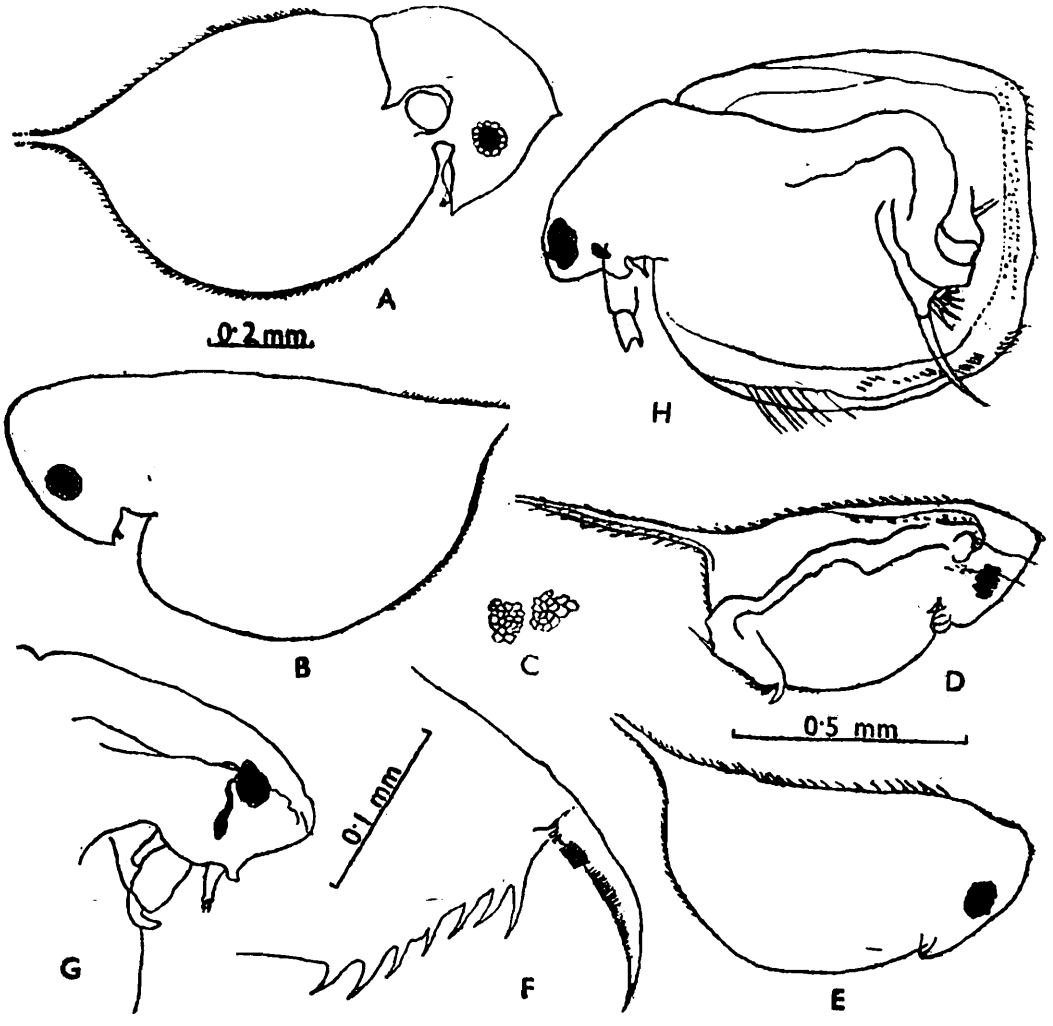
Family (2) DAPHNIDAE

9. Daphnia lumholtzi Sars

(Text-figs. 3A & 4C, D)

1885. *Daphnia lumholtzi* Sars, ♀. *Selsk. Forh.*, Christiania, No. 8 pp. 19-26, pl. 1, figs. 1-10, pls. 3 & 4.

1950. *Daphnia lumholtzi* : Brehm, *Rec. Indian Mus.*, Delhi, 48, pp. 19-21 figs. *a-e*.



TEXT-FIG. 3.—Cladocera from Rajasthan

(A) *Daphnia lumholtzi* Sars, ♀, lateral view. (B) *Daphnia hyalina* Leydig, ♀. lateral view. (C) Same, reticulation on carapace. (D) *Daphnia carinata* King-Young ♀. (E) Same, ♀ adult. (F) Same, end part of postabdomen. (G) *Simocephalus elizabethae* (King), ♀, anterior part. (H) *Simocephalus australiensis* (Dana) ♀, lateral view.

Magnifications : (A), (B), (C), to same scale. (D), (E), (G), (H), to same scale.

Material.—Ajmer Dist. : 4 exs., Anasagar Lake, Ajmer, 20.xi.61, (Coll. *Tej. Singh*). *Jaipur Dist.* : 4 exs., Balanadi, Dudu, 6.i.59, (Coll. *S. Biswas*).

Measurement.—Length 1·75 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere* : India : Uttar Pradesh, Bengal, Madras and Andhra Pradesh. Also W. Pakistan (W Punjab), Ceylon, Palestine, Syria, Egypt and Australia.

Remarks.—The important characters of this species are : long head-spine, well-developed and peculiar fornix, and long, distinct, marginal denticles of the valves.

10. **Daphnia carinata** King

(Text-figs. 3D & E)

1853. *Daphnia carinata* King, *Pap. and Proc. R. Soc. van Diemen Land*, Hover Town, **2**, (2), p. 246, pl. I &-VIA.

1896. *Daphnia carinata*, Sars, *Arch. Math. Natur. Vid.*, Christiania, **18** (3), pp. 5, 6, pl. 1, figs. 1-4.

1950. *Daphnia carinata*, Brehm, *Rec. Indian Mus.*, Delhi, **48** (1), pp. 21-23, text-figs. 5*a-d*, 6*a-d*.

Material.—*Ganganagar Dist. : ca.* 50 exs., Suratgarh, 7.x.60 ; many exs., Diplana, 13 km. E. of Nohar, 13.x.60, (Coll. *B. Biswas*). *Jodhpur Dist.* : Many exs., Ranisar, Phalodi-xii.57, (Coll. *K. K. Tiwari & S. Biswas*). *Jaipur Dist.* : *ca.* 100 exs., a ditch at Barbarya, Narayana, 1.xii.59 ; *ca.* 70 exs., Dudu Talao, Dudu, 8.i.59, (Coll. *S. Biswas*) ; 20 exs. Narainsar, *ca.* 6 km. on Phulera Road, 6.x.63, (Coll. *K. K. Mahajan*). *Jaisalmer Dist.* : 50 exs., Nokh, 26/27.viii.60 (Coll. *B. Biswas*) ; 30 exs. Geodeasar 24 km. S. of Ramgarh, 17.i.58, (Coll. *K. K. Tiwari & S. Biswas*). *Nagaur Dist. :* Many exs., Gurha, 3.ix.60, (Coll. *B. Biswas*). *Sikar Dist.* : Many exs., a tank 3 km. E. of Gunjara, 10.xi.60 ; many exs., 2 km. W. of Kanwarpura, 8.xii.60 ; many exs., Puran Chhoti, 9.xi.60, (All Coll. *B. Biswas*).

Measurements.—Length, 0·78 mm. (young) ; 1·75 mm. (adult).

Distribution.—*Rajasthan :* Previous record from Nagaur. Present records as mentioned above. *Elsewhere :* India : Punjab, Uttar Pradesh, Gujarat and Mysore. Also Ceylon and Australia.

Remarks.—Wagler (1926) synonymised the American species *D. similis* Claus with the present species, but Brooks (1956) considered these to be separate species on the character of the dorsal ridge of carapace which expands in *D. similis* in a plane at right angles to the plane of symmetry. The species is widely distributed in Rajasthan.

11. **Daphnia hyalina** Leydig

(Text-figs. 3B-C, 4A & B)

1860. *Daphnia hyalina* Leydig, *Natur. de Daphniden*. Tübingen, pp. 151-153, pl. I, figs. 8-10.

1909. *Daphnia longispina hyalina* forma *typica* Keilhack, Phyllopoda in Brauer's ["*Suss. Deut*".], Jena, **10**, p. 28, figs. 53 & 55.

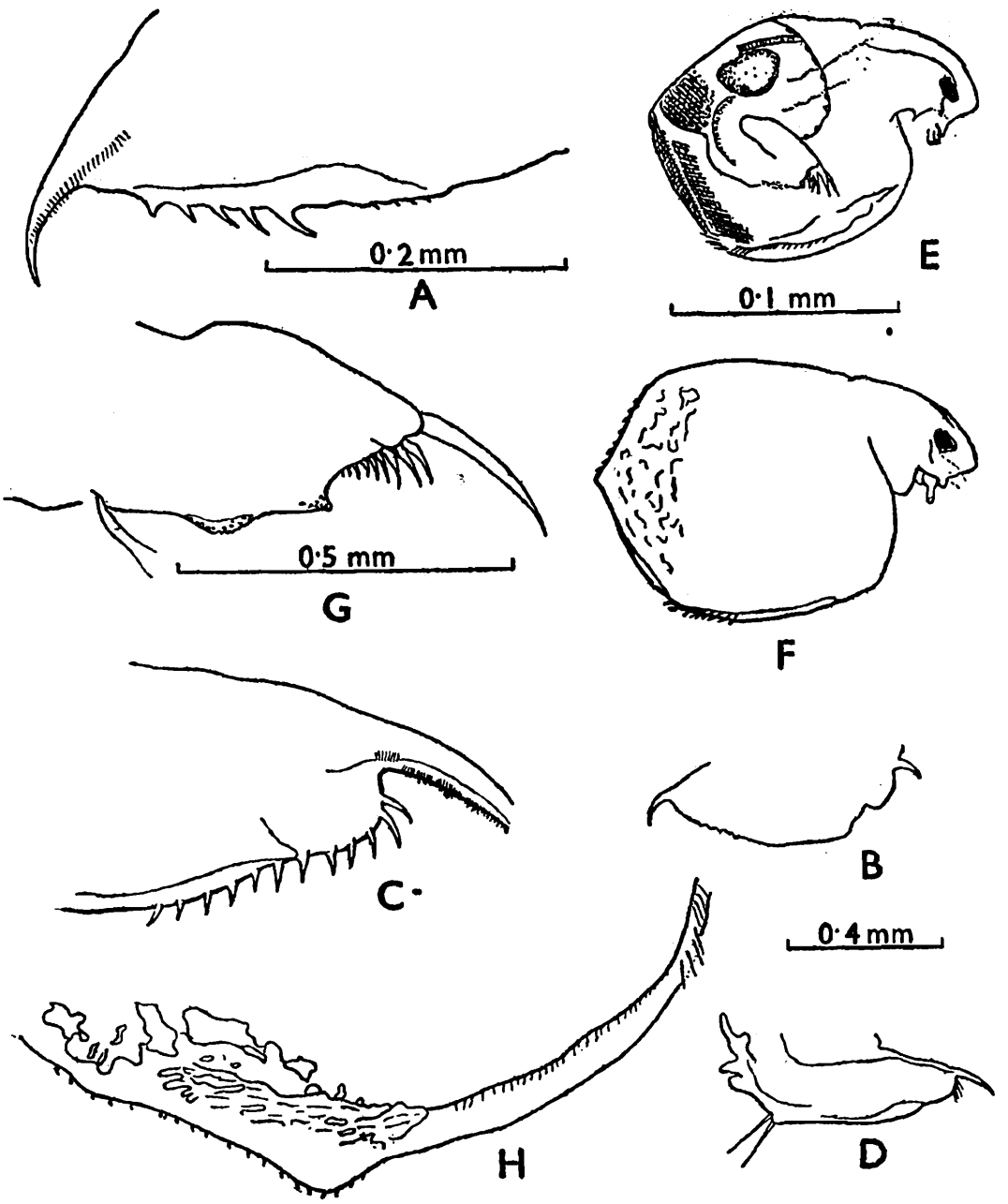
1918. *Daphnia longispina* var. *hyalina :* Birge, In *Freshwater Biol.*, New York, p. 697, figs. 10.70 & 10.71.

Material.—*Jaipur Dist.* : 2 exs., Balanadi, Dudu, 6.1.59, (Coll. *S. Biswas*. *Jaisalmer Dist. :* 1 ex., Geodiasar, Sta. 4, 7.i.58 : Coll. *K. K. Tiwari & S. Biswas*).

Measurement.—Length 1·75 mm.

Distribution.—*Rajasthan :* As above (first record from the area and from India). *Elsewhere :* Pakistan, Asia and N. America.

Remarks.—This is a variable species. Usually three varieties, *hyalina typica locustris* Sars and *galeata* Sars, are recognised. Variety *galeata* is identified by its pointed or angulate head and var. *hyalina* by its rounded head in which the ventral margin is straight or convex. In variety *locustris* the ventral head margin is distinctly concave and shell reticulation prominent. The present species differs from its nearest species, *D. longispina* Müller, in the shape of the rostrum and developed head-crest. *D. longispina* has been recorded by Brehm (1950) and Brehm & Weltereck (1939) from N. E. Himalaya.



TEXT-FIG. 4.—Cladocera from Rajasthan

(A) *Daphnia hyalina* Leydig, ♀, end part of postabdomen. (B) Same, postabdomen. (C) *Daphnia lumholtzi* Sars, ♀, end part of postabdomen. (D) Same, postabdomen. (E) *Simocephalus vetulus* (Müller), ♀, lateral view. (F) *Simocephalus elizar bethae* (King), ♀, lateral view. (G) Same, postabdomen. (H) Same, posterio part of body.

Magnifications : (A), (C), to same scale. (B), (D), to same scale, (E), (F), to same scale. (G), (H), to same scale.

12. Simocephalus australiensis (Dana)

(Text-figs. 3H & 5A)

1853. *Daphnia australiensis* Dana, *Report U.S. Explo. Expd., Crustaeea*, II, 14, p. 127, pl. 89, figs. 4*a-e*.

1822. *Simocephalus australiensis* : Henry, *Proc. Linn. Soc. N.S.W.*, Sydney, 42, p. 31, pl. 5, figs. 1-1*c*.

Material.—Jodhpur Dist. : 1 ex., Shivsar, Phalodi, 16.xii.57, *Jaisalmer Dist.* : 2 exs., Geodiasar, Ramgarh, 28.xii.57, (Coll. *K. K. Tiwari & S. Biswas*).

Measurement.—Length 1·13 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere* : Australia and South Africa.

Remarks.—This species is usually confused with *S. vetulus* (O. F. Müller) but can be separated from the latter by its rounded or rhomboidal ocellus, the general shape of the body and the upturned rostrum. The characteristic shell marking of *vetulus* is also lacking here.

13. Simocephalus elizabethae (King)

(Text-figs. 3G and 4H, G)

1852. *Daphnia elizabethae* King, *Pap. and Proc. R. Soc. Van Diemen Land.*, Hover Town, 2 (2), pp. 243-253.

1888. *Simocephalus elizabethae* : Sars, *Forth. Vidensk Selsk.*, Christiania, No. 7, pp. 22-25, pl. 2, figs. 6-7.

1935. *Simocephalus elizabethae* : Sowell, *Int. Rev. Ges. Hydr. u. Hydr.*, Leipzig, 31 (3-4), pp. 210, 211.

Material.—Jaipur Dist. : 30 exs., Devdani temple tank, Sambhar town, 13.xi.58. 7 exs., Dhobola Talao, Narayana, 31.x.58. 15 exs., Narayana Talao, Narayana, 2.xi.58. (Coll. *S. Biswas.*) 1 ex., Sambhar Lake, 17.vii.58, (Coll. *A. K. Mukherjee*).

Measurement.—Length 1·90 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere* : India : W. Bengal, Madhya Pradesh (Chota Nagpur). Also Ceylon, Thailand, Sumatra, Java and Australia.

Remarks.—The species differs from *S. vetulus* (O. F. Müller) in the shape of its posterior border of the carapace only and for this reason it has been synonymised with it by some authors.

The present specimens are larger than *vetulus* and there is no ovigerus female specimen of the shape of *elizabethae* bearing an ephippium.

14. **Simocephalus vetulus** (O. F. Müller)

(Text-figs. 4C and 6A)

1776. *Daphne vetula* O.F. Müller, *Zool. Daniae Prodromus seu Animalium Norvegiae, etc.*, Havniae, p. 199, No. 2399.

1850. *Daphnia vetula :* Baird, *Natural Hist. Brit. Entom., Ray. Soc.*, London, pp. 95, 96, pl. 10, fig. 1.

1853. *Daphnia sima* O. F. Müller, Lilljeborg, *Cladocera, Ostracoda et Copepoda in Scania occur.*, Lund, pp. 42-44, pl. III, figs. 2-4-(Synonymised by Baird, 1850).

Material.—Jaipur Dist. : 12 exs., Asalpura Bund, Phulera, 5.xii.58. 20 exs., Balanadi, Dudu, 6.i.59. 1 ex., Julga Lake, 21 km. S. W. of Gudha, 24.xi.58. 4 exs., Dudu Talao, Dudu, 8.i.59. 50 exs., Dhobola Talao, Narayana, 31.x.58, 5 exs., Kalo Talao, Narayana, 1.xi.58. 1 ex., Narayana Talao, Narayana, 3.xi.58 (Coll. *S. Biswas*). 20 exs. Sambhar Lake (Main), 17.vii.58 (Coll. *A. K. Mukherjee*). *Jaisalmer Dist. :* 1 ex., Geodiasar, Jaisalmer, 28.xii.57. (Coll. *K. K. Tiwari & S. Biswas*).

Measurement.—Length 1·30 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere :* India : Northern U.P., Kashmir and Punjab. Also Europe (England, Switzerland, Turkey, Russia) and N. and S. America.

Remarks.—It is one of the commonest species of Rajasthan and is usually found in weedy pools. Important characters for its identification are : Frons rounded, ocellus elongate carapace markings as oblique-parallel lines and usually without carapace-spine.

15. **Simocephalus latirostris** Stingelin

(Text-figs. 6B-D)

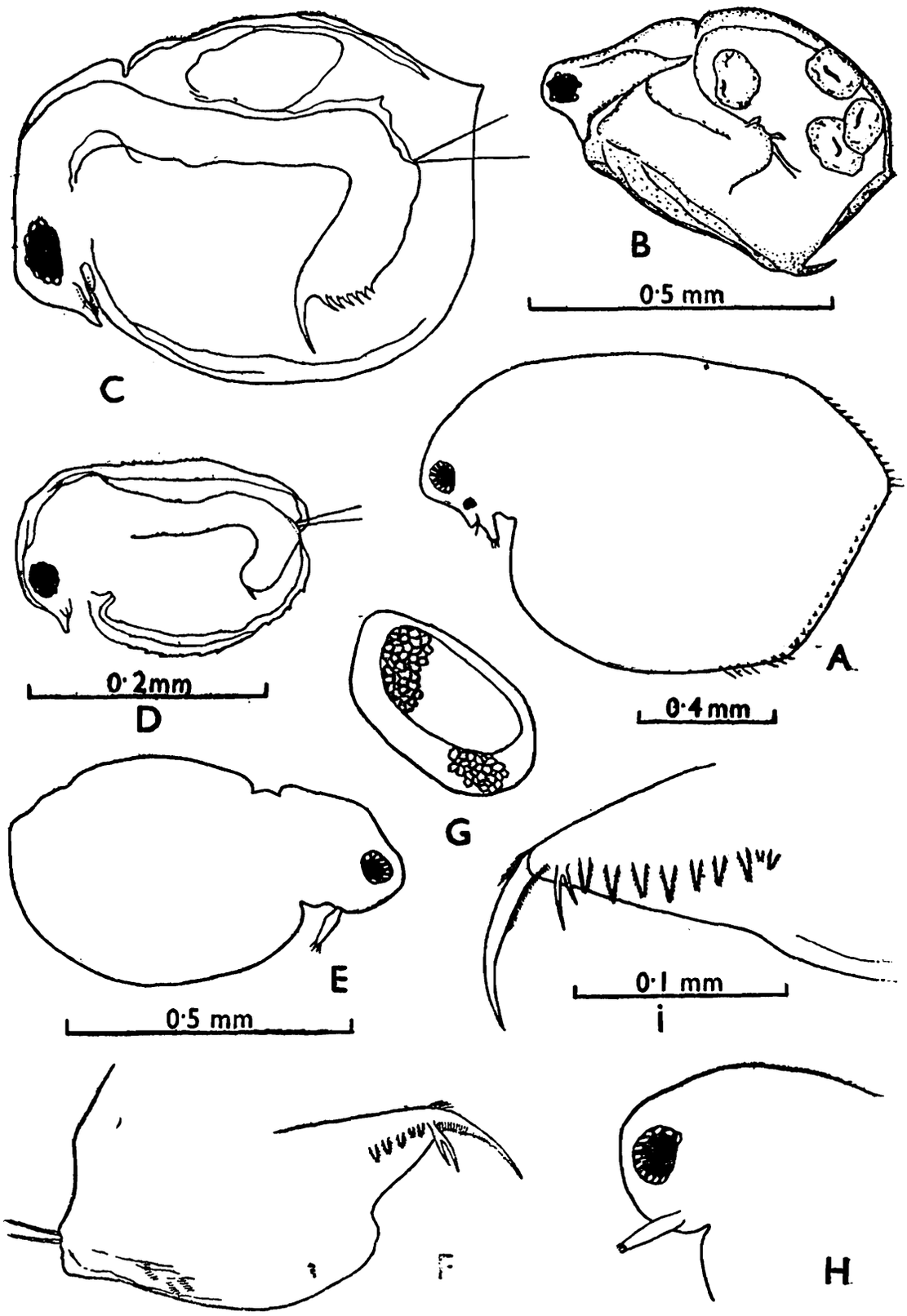
1906. *Simocephalus latirostris* Stingelin, *Ann. Biol. Lacustre*, Brusells, **14**, pp. 187-189, figs. 5-7.

Material.—Jaipur Dist. : 1 ex., Julga Lake, 21 km. S.W. of Gudha, 24.xi.58 (Coll. *S. Biswas*).

Measurement.—Length 2 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere :* Paraguay (S. America).

Remarks.—The species is allied to *S. serrulatus* (Koch), but differs in its larger size, peculiar long rostrum, polygonal markings on shell, dersal bulge of head, and the character of the postabdomen.



TEXT-FIG. 5.—Cladocera from Rajasthan

(A) *Simocephalus australiensis* (Dana), ♀, lateral view. (B) *Scapholeberis kingi* Sars, ♀, lateral view. (C) *Ceriodaphnia rigaudi* Richard, ♀, lateral view. (D) Same, juvenile. (E) *Moina dubia* Guerne & Richard, ♀, lateral view. (F) Same, postabdomen. (G) Same, ephippium. (H) *Moina macrocopa* (Straus), ♀, lateral view. (I) Same, postabdomen.

Magnifications: (C), (D), to same scale. (E), (G), (H), to same scale. (F), (I), to same scale.

16. **Scapholeberis kingi** Sars

(Text-fig. 5b)

1903. *Scapholeberis kingi* Sars, *Archiv. Math. Natur.*, Christiania, **25**, pp. 8-10, pl. 1, figs. 2*a-c*.

1916. *Scapholeberis kingi :* Sars, *Ann. S. Afr. Mus.*, Capetown, **15**, pp. 314, 315, pl. 32, fig. 3*b*.

Material.—Jaipur Dist. : 5 exs., Asalpura Burd, Phulera, 5.xii.58, (Coll. *S. Biswas*).

Measurement.—Length 1·01 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere :* India : W Bengal. Also Thailand, Sumatra, Australia, Africa and N. America.

Remarks.—According to Gurney (1906), excepting for its small size the species is inseparable from *S. mucronata* (O. F. Müller). The other nearest species, *S. aurita* (Fischer), can be separated by its whitish or greenish colour which is never dark or black as in the present species.

17. **Ceriodaphnia rigaudi** Richard

(Text-figs. 5C & D)

1894. *Ceriodaphnia rigaudi* Richard, *Bull. Soc. Zool. France*, Paris, **7**, pp. 239-241.

1916. *Ceriodaphnia rigaudi :* Sars, *Ann. S. Afr. Mus.*, Cape Town, **15**, p. 319, pl. 34, figs. 3, 3*a, b*.

1935. *Ceriodaphnia rigaudi :* Sewell, *Int. Rev. ges. Hydr. u. Hydr.*, Leipzig, **31**, (3 & 4), pp. 211-212.

Material.—Ajmer Dist. : 5 exs., Anasagar Lake, Ajmer, 20.xi.61, (Coll. *Tej Singh*). *Jaipur Dist. :* 2 exs., water-pools, 3 km. W of Phulera, 4.xii.58, 15 exs., Dudu Talao, Dudu, near Rest House, 8.i.58. Julga Lake 21 km. S. W. of Gudha, 24.xi.58. *Nagaur Dist. :* 10 exs., a ditch adjacent to Sambhar Lake, Gudha, 17.xi.58. 4 exs. Julga Lake 22-50 Km. S. W. of Gudha, 24. xi. 58. 5 exs., Bala Talao, *ca.* 5 km. S. E. of Julga Lake, 24.xi.58. 2 exs., Narayana Talao, Narayana, 2.xi.58. 4 exs., Kalo Talao, Narayana, 6.xi.58, (Coll. *S. Biswas*). *ca.* 50 exs., Narinsar, 6 km. on Phulera Road, 6.x.63, (Coll. *K. K. Mahajan*). *Barmer Dist. :* 5 exs., Bhap tank, *ca.* 11 km. from Barmer town, 25.i.58, (Coll. *K. K. Tiwari & S. Biswas*).

Measurement.—Length 0·35 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere :* India : W Bengal, Bihar, Andhra, Mysore, Madhya Pradesh and Gujarat. Also S. E. Asia, Japan, Palestine, Egypt, S. Africa and N. and S. America.

Remarks.—This species is widely distributed in Rajasthan as well in India as a whole. It is distinctive due to a short spine or horn on its head in front of the antennules.

18. **Ceriodaphnia reticulata** (Jurine) var. **kurzii** Stingelin

(Text-fig. 6F)

1895. *Ceriodaphnia kurzii* Stingelin, *Rev. suisse Zool.*, Geneva, 3, pp. 214-215, pl. 6, fig. 15 ; & pl. 6, fig. 18.

1908. *Ceriodaphnia reticulata* (Jurine) var. *kurzii*, Stingelin, *Cat. Phyllopods Mus. d'Hist. Nat. Geneve*, Geneva, pp. 50, 51. (*kurzii* considered as variety of *reticulata*).

Material.—*Jaipur Dist. :* Many exs., Devdyani temple tank near Sambhar town, 13.xi.58. *Nagaur Dist. :* 1 ex., Sambhar Lake, Sta. 6, Gudha, 10.xi.58, (Coll. *S. Biswas*).

Measurement.—Length 0·38 mm.

Distribution.—*Rajasthan :* As above (first record from the area and from India). *Elsewhere :* Europe and England.

Remarks.—This variety differs from the typical form, *C. reticulata* (Jurine), in having a plain shell without marking and the fornix more or less plain, not prominently rounded.

19. **Ceriodaphnia reticulata** (Jurine) var. **serrata** Sars

(Text-fig. 9E-G)

1890. *Ceriodaphnia reticulata* var. *serrata* Sars, *Forh. vid. Selsk.*, Christiania, No. 1, p. 37.

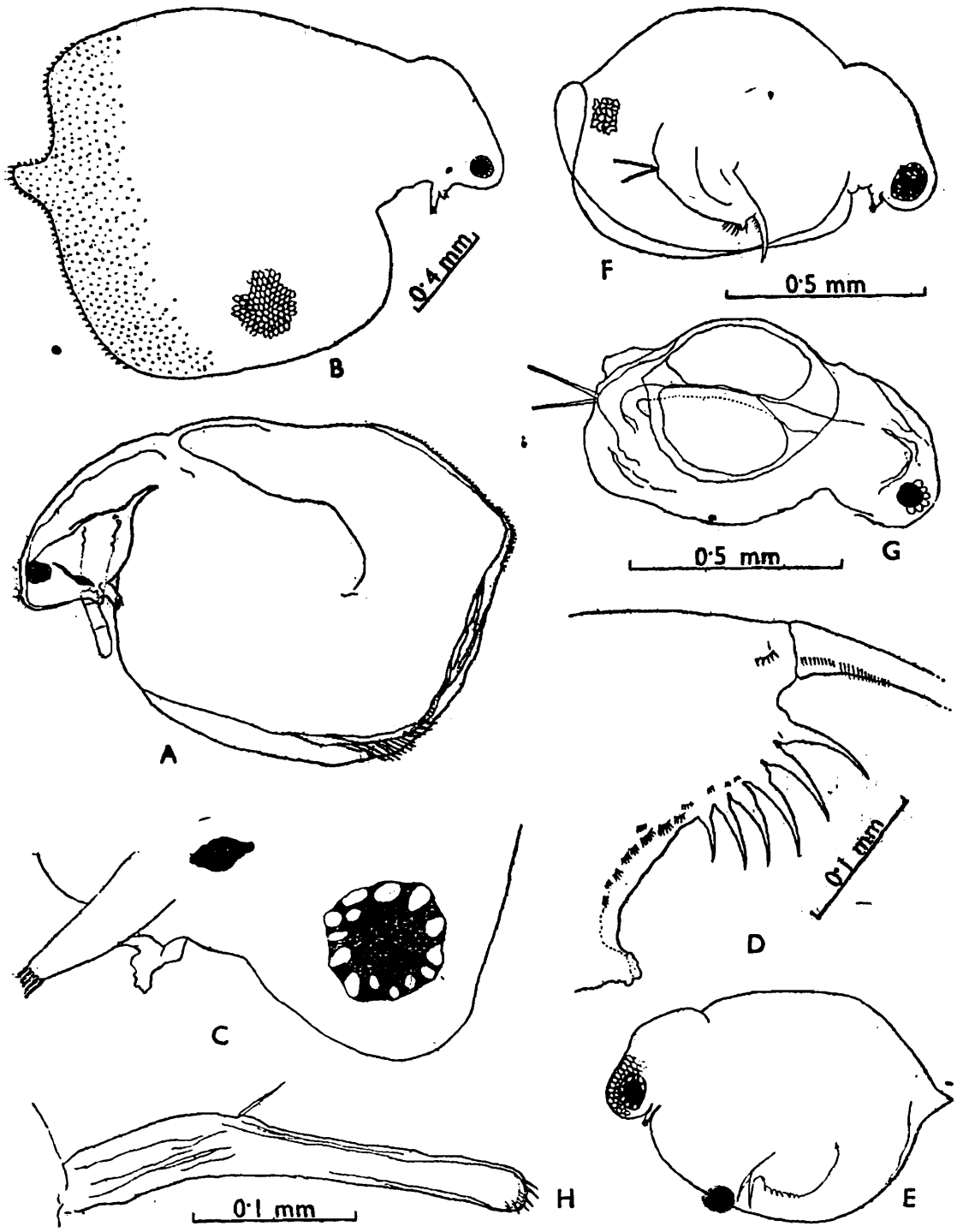
1962. *Ceriodaphnia reticulata* var. *serrata :* Srámek-Haüsek, *Fauna C.S.S.R.*, Prague, **16**, pp. 232-233, figs. 82 A-F.

Material.—*Nagaur Dist. :* 1 ex., cemented tank in Gudha *kyār*, Gudha, 15.x.58, (Coll. *S. Biswas*). *Jaipur Dist. :* Many exs., Narinsar, *ca.* 6 km. on Phulera Road, 6.x.63, (Coll. *K. K. Mahajan*).

Measurement.—Length 0·40 mm.

Distribution.—*Rajasthan :* As above (first record from the area and from India). *Elsewhere :* Europe.

Remarks.—This variety differs from the typical form as well as var. *kurzii* in having extended fornices ; the body is prominently reticulate.



TEXT-FIG. 6.—Cladocera from Rajasthan

(A) *Simocephalus vetulus* (O. F. Müller), ♀, lateral view. (B) *Simocephalus latirostris* Stingelin, ♀, lateral view. (C) Same, anterior part. (D) Same, posterior part of postabdomen, magnified. (E) *Ceriodaphnia laticaudata* P. E. Müller, ♀, lateral view. (F) *Ceriodaphnia reticulata* var. *kurzii* Stingelin, ♀, lateral view. (G) *Moina dubia* Guerne & Richard, ♀, lateral view. (H) Same, ♂, antennule.

Magnifications: (A), (G), to same scale. (C), (D), to same scale. (E), (F), to same scale.

20. **Ceriodaphnia laticaudata** P. E. Müller

(Text-fig. 6C)

1867. *Ceriodaphnia laticaudata* P.E. Müller, *Nat. Tidskr.*, (3) 5, p. 130, pl. 1, fig. 19.

1959. *Ceriodaphnia laticaudata:* Brooks, *Freshwater Biology*, New York, p. 620, fig. 27.92.

1962. *Ceriodaphnia laticaudata:* Husek, *Fauna C.S.S.R.*, Prague, 16, pp. 241-242, figs. 87 A-K.

Material.—Jaipur Dist.: 1 ex., canal water of Dhobola Talao, Narayana, 9.x.59, (Coll. *S. Biswas*).

Measurement.—Length 0·91 mm.

Distribution.—Rajasthan: As above (first record from the area). *Elsewhere:* India: Poona (Maharashtra) and Simla Hills. Also Turkestan, Europe, Africa, Madagascar and Australia.

Remarks.—The present specimen has seven anal spines on the post-abdomen; the shape of the postabdomen is characteristic of the species.

21. **Moina dubia** Guerne & Richard

(Text-figs. 5E—G and 6G, H)

1892. *Moina dubia* Guerne & Richard, *Mem. Soc. Zool. France*, Paris, 5, pp. 527-530, figs. 1 and 2.

1935. *Moina dubia:* Sewell, *Int Rev. ges. Hydrob. u. Hydrogr.*, Leipzig, (1) 3, pp. 213-216, figs. 1 and 2.

1953. *Moina dubia:* Brehm, *Osterr. Zool. Z.*, Vienna, (4) 3, pp. 334-336.

Material.—Jaipur Dist.: 4 exs., Bala Talao, *ca.* 5 km. S. E. of Julga Lake, 24.ii.58. 20 exs., Julga Lake, 21 km. S. W of Gudha, 24.ii.58. 2 exs., water-pools, 3 km. W. of Phulera, 4.xii.58. *Nagaur Dist.:* 10 exs., cemented tank in Gudha *kyār*, Gudha, 4.x.58. 5 exs., rain-water pools by side of railway bund, Gudha, 19.ix.58, (Coll. *S. Biswas*).

Measurement.—Length 0·65 mm.

Distribution.—Rajasthan: As above (first record from the area). *Elsewhere:* India: W. Bengal, Bihar and S. India. Also Java, Australia, Africa (Sahara, Uganda, Congo, Transvaal and Kenya) and Europe.

Remarks.—Sewell (1935) did not distinguish the present species from *M. rectirostris* (Leydig). According to Brehm (1953), the characters, *viz.*, the proximal part of ventral margin of valves with strong spines, the distal part with groups of spinules, the proportion 1 : 2 of the reduced distal part to the broad proximal part of the postabdomen, absence of accessory ridge on end-claw and the head depression at an angle of 70°, are important enough for the separation of this species. In the opinion of Hausek (1962) it is synonymous with *M. micrura* Kurz.

22. **Moina brachiata** (Jurine)

(Text-figs. 8D, E)

1820. *Monocules brachiatus* Jurine, *Historie Monocles Génevé*, Geneva & Paris, p. 131, pl. 12, figs. 1, 2.

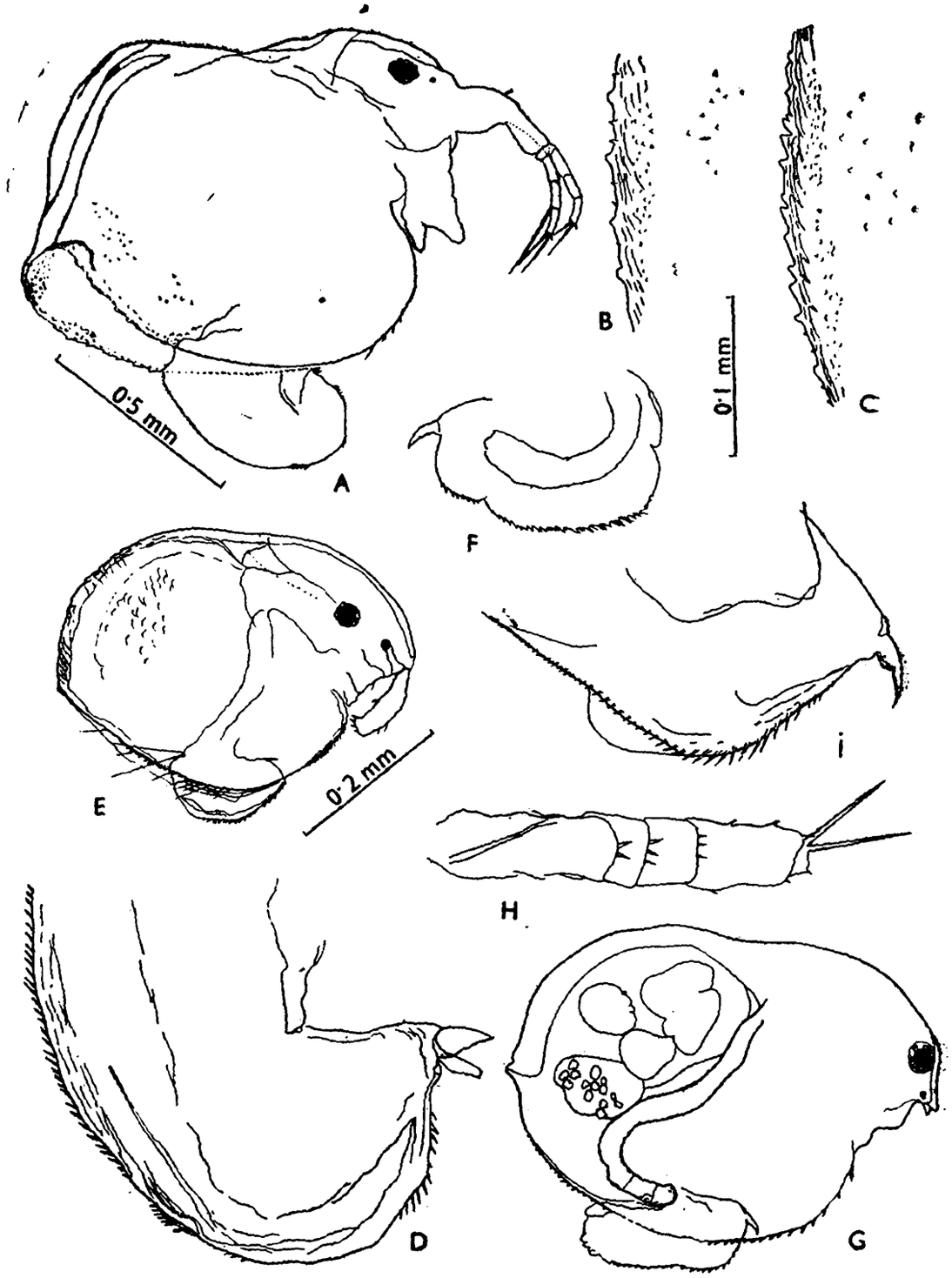
1850. *Moina brachiata:* Baird *Natural History* Brit. *Entom.*, Ray Soc., London, 102, pl. IX, figs. 1, 2.

Material.—Jaipur Dist.: 15 exs., water-pools, *ca.* 3 km. W. of Phulera, 4.xii.58, *Nagaur Dist.:* 6 exs., Gudha Talao, 1·60 km. N. W. of Gudha village, 22.x.58, (Coll. *S. Biswas*).

Measurement.—Length 0·78 mm.

Distribution.—Rajasthan : As above (first record for the area and from India). *Elsewhere :* W Pakistan, Europe, Africa and N. America.

Remarks.—The present species is difficult to identify without the ephippium-bearing females or males in the collection. But the character of anal spine being without ciliation can be taken into consideration in distinguishing parthenogenetic females from other allied species, *i.e.*, *M. rectirostris* (Leydig) or *M. dubia* Guerne & Richard.



TEXT-FIG. 7.—Cladocera from Rajasthan

(A) *Macrothrix triserialis* Brady, ♀, lateral view. (B) and (C), Same, upper and lower ventro-posterior margin of valves respectively. (D) Same, postabdomen. (E) *Macrothrix spinosa* King, ♀, lateral view. (F) Same, postabdomen. (G) *Gurneyella odiosa* (Gurney), ♀, lateral view. (H) Same, antennule. (I) Same, postabdomen.

Magnifications : (A), (G), to same scale. (B), (C), (D), (F), (H), (I), to same scale.

23. **Moina rectirostris** (Leydig)

(Text-figs. 9A-D)

1860. *Daphnia rectirostris* Leydig, *Naturg. Daphiden*, Tübingen, p. 174, pl. 10, figs. 76, 77.

1959. *Moina rectirostris* (Leydig) Brooks, *Freshwater Biology*, New York, p. 623, figs. 27,50*a*.

1962. *Moina rectirostris* : Sra'mek-Hausek; *Fauna C.S.S.R.*, Prague, 16, pp. 247-248, figs. 89 A-D.

Material.—*Ganganagar Dist.* : Many exs., 18 km. N.W. of Nohar 16.x.60, (Coll. *B. Biswas*). *Nagaur Dist.* : Many exs., Gudha, Sambhar Lake, 21.xi.58. Many exs., Nawa on Sambhar Lake, 16 & 25.ix.58, (Coll. *S. Biswas*).

Measurement.—Length 0·38 mm.

Distribution.—*Rajasthan* : As above (first record from the area). *Elsewhere* : India : Kashmir. Also widespread in palaearctic, nearctic and ethiopian regions.

Remarks.—The present species is close to *M. dubia* Guerne &Richard, and *M. micrura* Kurz, but can be separated by having 9-15 anal spines, a reticulated ephippium and the male antennule having 5 end-spines.

24. **Moina banffyi** Daday

(Text-figs. 10A-E)

1888. *Moina banffyi* Daday, *Term. tud. Tars.*, Budapest, pp. 1-128.

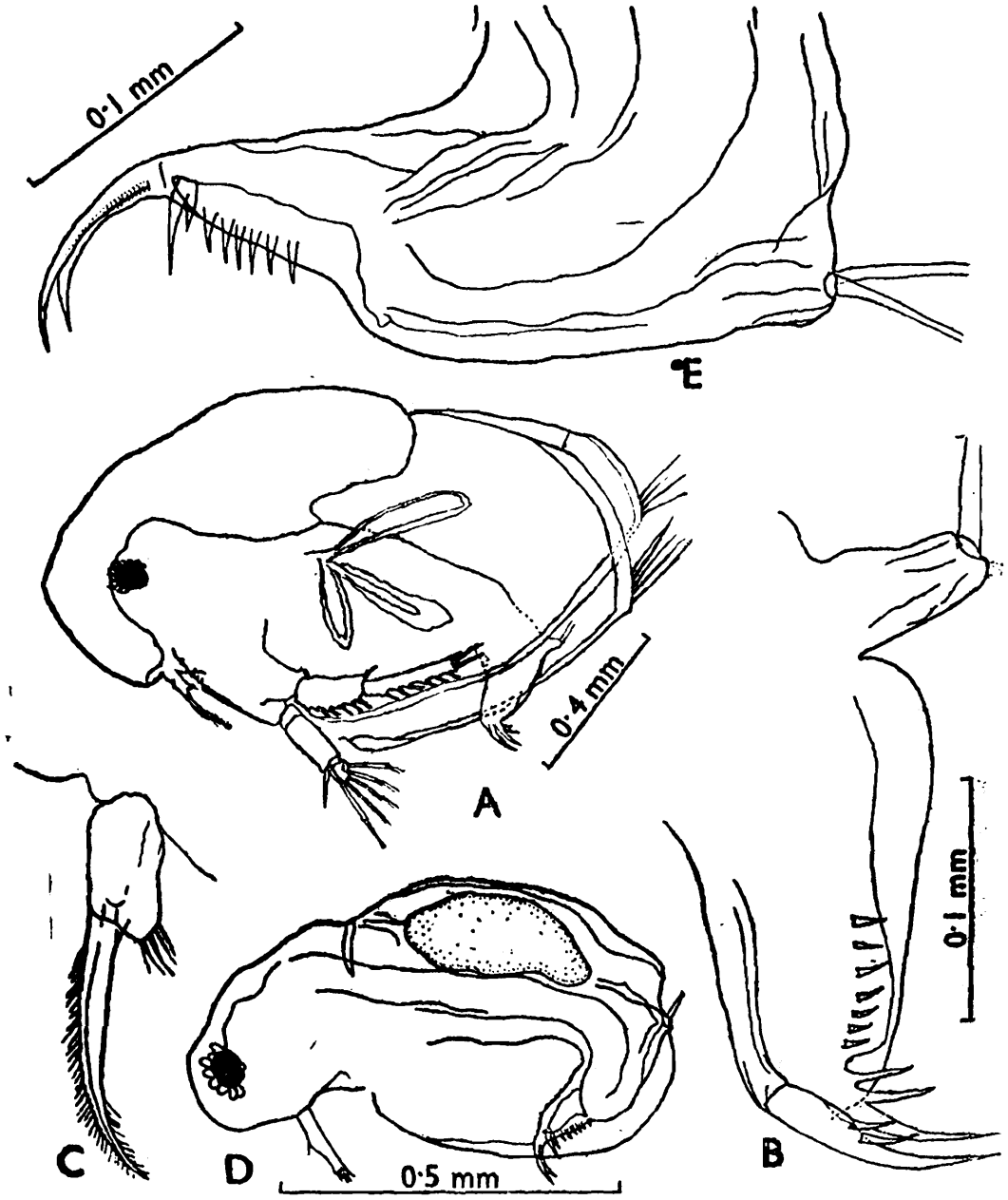
1903. *Moina banffyi* : Scourfieed, *J. Quckett micr. clube*, London, 8 (2), No. 52, pp. 437-438, pl. 24, figs. 5-8.

Material.—*Jaipur Dist.* : 15 exs., water-pools, 3 km. W of Phulera, 11.xii.58. *Nagaur Dist.* : 10 exs., adjacent to Sambhar Lake, Gudha, 17.x.58, (Coll. *S. Biswas*). Many exs., New *kyar*, Sambhar Lake, 22.xi.58, (Coll. *B. Biswas*).

Measurement.—Length 0·94—1·10 mm.

Distribution.—*Rajasthan* : As above (first record from the area and from India). *Elsewhere* : Europe (Hungary and England).

Remarks.—Important characters of this species are : Head without depression and more or less hairy ; shell-marking as in *Simocephalus* ; antennule covered with scale-like markings and hairy. It is close to *M. belli* Gurney, but is separable by the posterior part of the shell being drawn out into a spine.



TEXT-FIG. 8.—Cladocera from Rajasthan

(A) *Latonopsis australis* Sars, ♀, lateral view. (B) Same, postabdomen. (C) Same ♂, antennule. (D) *Moina brachiata* (Jurine), ♀, lateral view. (E) Same, postabdomen.

Magnifications : (B), (C), to same scale.

25. **Moina macrocopa** (Straus)

(Text-figs. 5H, I)

1820. *Daphnia macrocopus* Straus, *Mem. Mus. Hist. nat.*, Paris, 5, p. 161.

1916. *Moina macrocopa* (Straus) Sars, *Ann. S. Afr. Mus.*, Cape Town, 15, p. 320, pl. 35, figs. 1, 10.

Material.—Ganganagar Dist.: 1 ex., Diplana, E. of Nohar 13.x.60, (Coll. *B. Biswas*).

Measurement.—Length 0·97 mm.

Distribution.—Rajasthan: As above (first record from the area and from India). *Elsewhere:* Central Asia, Japan, Africa, Europe and N. America.

Remarks.—Due to the absence of ephippium-bearing males and females in the collection, the identification of the specimen is a little uncertain. However, the absence of supraocular depression and the pectination on the end-claw suggest assignment as above.

Family (3) MACROTHRICIDAE

26. **Streblocerus serricaudatus** (Fischer)

(Text-figs. 13A, B)

1849. *Daphnia serricaudatus* Fischer, *Bull. Soc. imp. Nat.* Moscow, **22** (38), p. 46, pl. 4, figs. 2-8.

1959. *Streblocerus serricaudatus* (Fischer) Brooks, *Freshwater biology*, New York, p. 627, figs. 27,58, 27.59.

Material.—Jaipur Dist.: 1 ex., Asalpura Bund, Phulera, 5.xii.58, (Coll. *S. Biswas*).

Measurement.—Length 0·91 mm.

Distribution.—Rajasthan: As above (first record from the area and from India). *Elsewhere:* Europe and N. America.

Remarks.—Unfortunately at the time of preparing the specimen for examination, the antennule and the postabdomen were lost. The specimen agrees with the description of *S. serricaudatus*.

27. **Macrothrix spinosa** King

(Text-figs. 7E, F)

1852. *Macrothrix spinosa* King, *Pap. Proc. Roy. Soc. Van Diemen Land*, Hover Town, **2** (2), pp. 25-26, pl. 6E.

1888. *Macrothrix spinosa* : Sars, *Forh. vid. Selsk.*, Christiania, No. 7, pp. 25-32, pl. 3, figs. 1-6.

1933. *Macrothrix spinosa:* Brehm, *Arch. Hydrobiol.*, Stuttgart, **11**, pp. 695-698.

Material.—Jaipur Dist.: 2 exs., Asalpura Bund, Phulera, 5.xii.58 ; (Coll. *S. Biswas*) *Jaisalmer Dist.:* 4 exs., Gadisar, Jaisalmer, 28.xi.57 ; 1 ex., Biprasar, Ramghar, 4.i.58 ; 2 exs., Geodeasar, Ramghar, Sta. 4, 4 & 7.i.58, (Coll. *K. K. Tiwari & S. Biswas*). *Nagaur Dist.:* 2 exs. rainwater pools near Nawa *kyār*, 28.ix.58. 4 exs., water-pools adjacent to Sambhar Lake, Gudha, 17.ix.58, (Coll. *S. Biswas*).

Measurement.—Length 0·45 mm.

Distribution.—Rajasthan: As above (first record from the area and from India). *Elsewhere:* Malaysia (Singapore), Thailand, Sumatra Java, Australia, Africa and S. America.

Remarks.—The species is close to *M. hirsuticornis* Norman & Brady and *M. laticornis* (Jurine), but is easily distinguished from the former by its squamose marking on the shell and from the latter in its bilobed postabdomen.

28. **Macrothrix triserialis** Brady

(Text-figs. 7A-D)

1886. *Macrothrix triserialis* Brady, *J. Linn. Soc. Lond.* (*Zool.*), London, **19**, p. 295, pl. 47, figs. 16-20.

1907. *Macrothrix triserialis*: Gurney, *Rec. Indian Mus.*, Calcutta, **1**, p. 25, pl.2, figs. 21, 21*a*.

Material.—Jaisalmer Dist.: 1 ex., Sta. 4, Biprasar, Ramgarh, 4.i.58, (Coll. *K. K. Tiwari & S. Biswas*).

Measurement.—Length 1·19 mm.

Distribution.—Rajasthan: As above (first record from the area) : *Elsewhere:* India : Madhya Pradesh and Ceylon.

Remarks.—The species is separated from the *M. chevreuxi* Guerne & Richard by the shape of its body and the shape and arrangement of teeth on the postero-ventral margin of carapace and its lip-plate.

29. **Macrothrix chevreuxi** Guerne & Richard

1892. *Macrothrix chevreuxi* Guerne & Richard, *Mem. Soc. Zool. France*, Paris, **5**, pp. 530-33, figs. 3-6.

1910. *Macrothrix chevreuxi:* Daday, *Zoologica*, Stuttgart, **23** (5-9), p. 139, pl. 7, fig. 27.

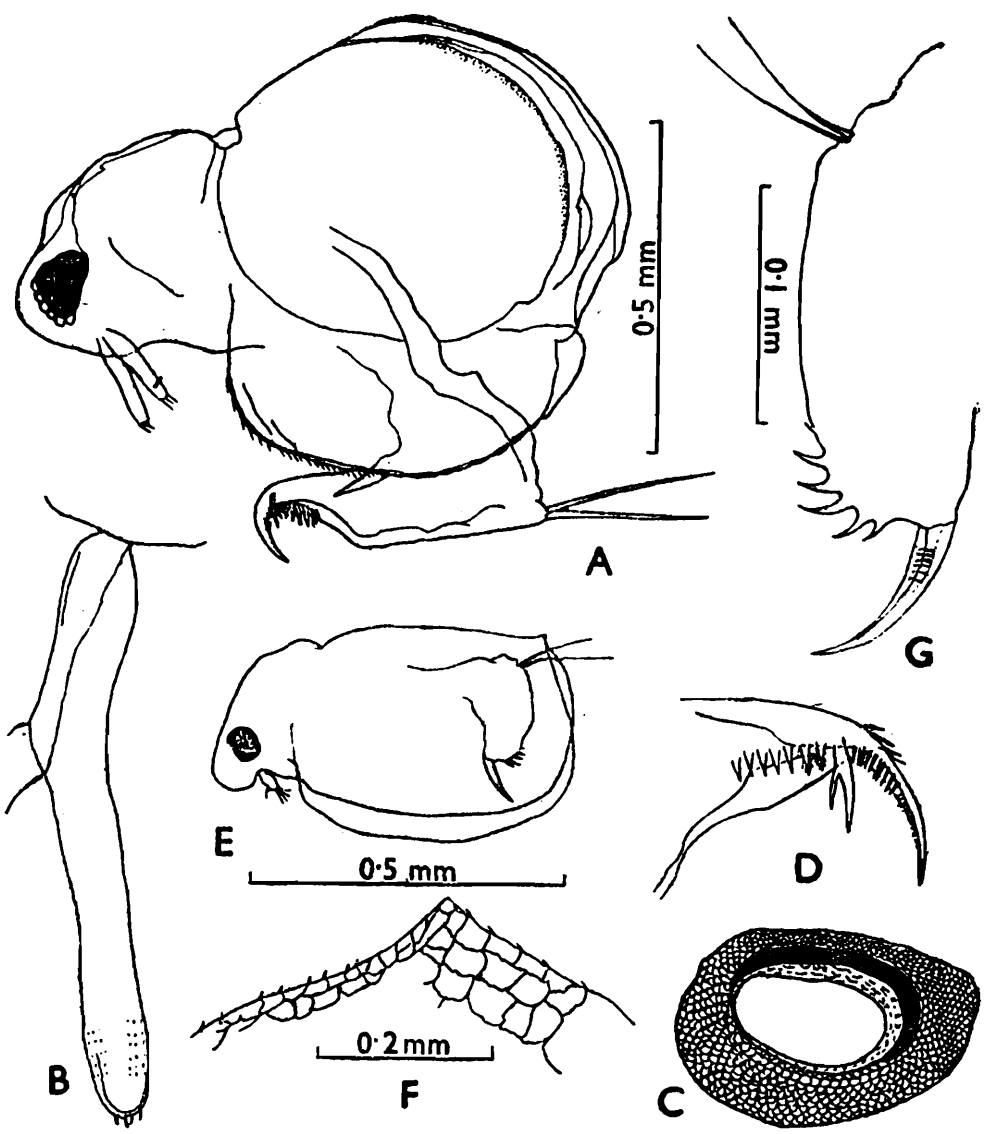
1934. *Macrothrix chevreuxi:* Jenkin, *Ann. Mag. nat. Hist.*, London, (10) **13**, pp. 281-283, figs. 13, 13*a*.

Material.—*Nagaur Dist.* : 3 exs., rainwater pools near Nawa *kyār*, 28.ix.58. 1 ex., Kuchaman Road, 5.ix.58. 5 exs., adjacent to Sambhar lake, Gudha, 17.x.58, (Coll. *S. Biswas*).

Measurement.—Length 1·01 mm.

Distribution.—*Rajasthan* : As above (first record from the area and from India). *Elsewhere* : Africa and S. America.

Remarks.—The present species has often been treated as a variety of *M. triserialis* Brady, but can be separated from the latter by the transverse line of sculpturing joining irregularly on the carapace, greater length of the antennules which are almost of equal width throughout, and by the less heavy armature of the postabdomen. The shape of lip-plate is also important in differentiating this species.



TEXT-FIG. 9.—Cladocera from Rajasthan

(A) *Moina rectirostris* (Leydig), ♀, lateral view. (B) Same, ♂, antennule, (C) Same, ♀, ephippium. (D) Same, ♀, postabdomen. (E) *Ceriodaphnia reticulata* var. *serrata* Sars, ♀, lateral view. (F) Same, posterior part, enlarged. (G) Same, postabdomen.

Magnifications : (A), (C), to same scale. (B), (D), (G) to same scale.

30. Gurneyella odiosa (Gurney)

(Text-figs. 7 G-I)

1907. *Macrothrix tenuicornis* Gurney, *Rec. Indian Mus.*, Calcutta, 1 (2) p. 25, pl. I, figs. 1, 2 ; and pl. I2, fig. 22 (specific name preoccupied).

1907. *Macrothrix odiosa :* Gurney, *Rec. Indian Mus.*, Calcutta, 1 (2), p. 175.

Material.—Jaisalmer Dist. : 8 exs., Biprasar tank, Ramgarh, Sta. 4, 4.i.58. 15 exs., Gadisar, Jaisalmer, *ca.* 19 km. from Ramgarh, 7.i.58, (Coll. *K. K. Tiwari & S. Biswas*). *Nagaur Dist. :* 1 ex., rainwater pools near Nawa *kyār*, 13.ix.58, (Coll. *S. Biswas*).

Measurement.—Length 1 mm.

Distribution.—Rajasthan : As above (first record from the area), *Elsewhere :* India : Madhya Pradesh.

Remarks.—Brehm (1930, 1933) assigned to the present genus those species of the *Macrothrix* in which the anus is guarded by a pair of peculiar flaps. The same character was also noticed by Gurney in this species.

31. Ilyocryptus halyi Brady

(Text-figs. 12 B-D)

1886. *Ilyocryptus halyi* Brady, *J. Linn. Soc. Lond. (Zool.)*, London, 19, pp. 294, 295, pl. 37, figs. 6-9.

1888. *Ilyocryptus longiremis* Sars, *Forh. vid. Selsk.*, Christiania, No. 7, pp. 32-41, pl. 4 (synonymised by Brady, 1898) *Termez. Füz.*, 21, pp. 48-50).

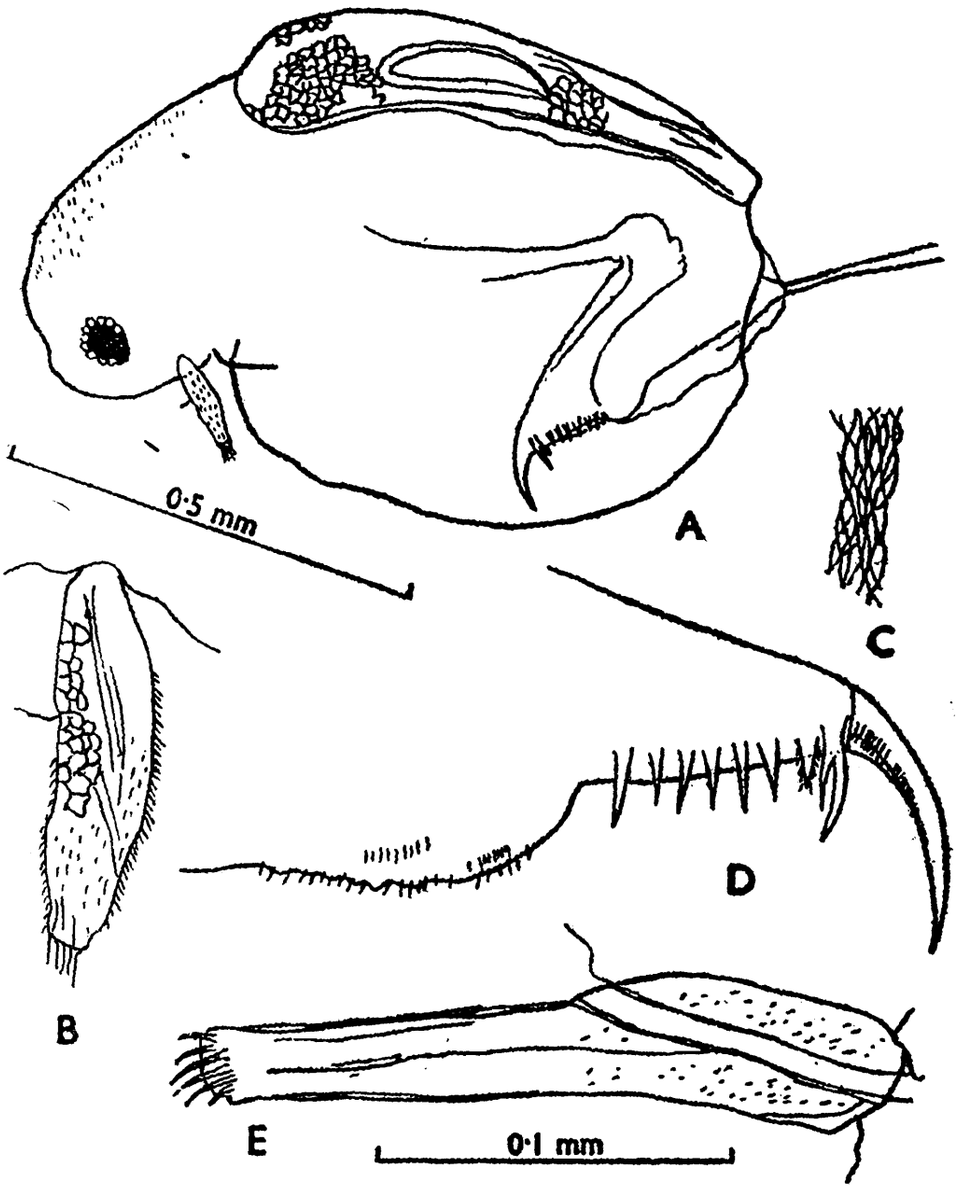
1898. *Ilyocryptus halyi :* Daday, *Termes Fuzetek.*, Budapest, Suppl. to vol. 21, pp. 48-50, figs. 23 *a-d.*

Material.—Jaipur Dist. : 1 ex., canal water of Dhobola Talao, Narayana, 20.x.58. 1 ex., Devdyani temple tank, Sambhar town 13.xi.58. 2 ex., Julga Lake, 21 km. W. of Gudha, 24.xi.58, (Coll. *S. Biswas*).

Measurement.—Length 0·65 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere :* India : W Bengal. Also Australia, Malaysia (Singapore), Indonesia (Sumatra, Java, Celebes), Africa and N. and S. America.

Remarks.—I. halyi differs from its nearest ally, *I. sordidus* (Lievén), by its less massive and longer antennae, lesser number of preanal spines (9-10) and angulate front; and from *I. spinnifer* Herrick in having more preanal spines and shorter antennae. Sometimes *spinnifer* is considered synonymous with the present species.



TEXT-FIG. 10.—Cladocera from Rajasthan

(A) *Moina banffyi* Daday, ♀, lateral view. (B) Same, antennule. (C) Same marking on shell. (D) Same, postabdomen. (E) Same, ♂, antennule.

Magnifications: (*b*)-(*e*), to same scale.

Family (4) CHYDORIDAE

32. Leydigia laevis Gurney

(Text-fig. 12 L)

1927. *Leydigia laevis* Gurney, *Proc. zool. Soc., Lond.*, London, 1, pp. 73-75, text-figs. 9 A-C.

Material.—Nagaur Dist. : 1 ex., water pools adjacent to Sambhar Lake, Gudha, 17.i.58, (Coll. *S. Biswas*).

Measurement.—Length 0·92 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere :* Australia.

Remarks.—Specimens of this species have no striation on the shell, no basal spine on the end claw and a triangular ocellus which is scarcely larger than the eye.

33. Leydigia acanthocercoides (Fischer)

(Text-fig. 12 F)

1884. *Lynceus acanthocercoides* Fischer, *Bull. Soc. nat. Moscou*, Moscow, 27, p. 431, pl. 3, figs. 21-23.

1905. *Leydigia acanthocercoides :* Daday, *Zoologica*, Stuttgart, 18, p. 185, pl. 11 fig. 19.

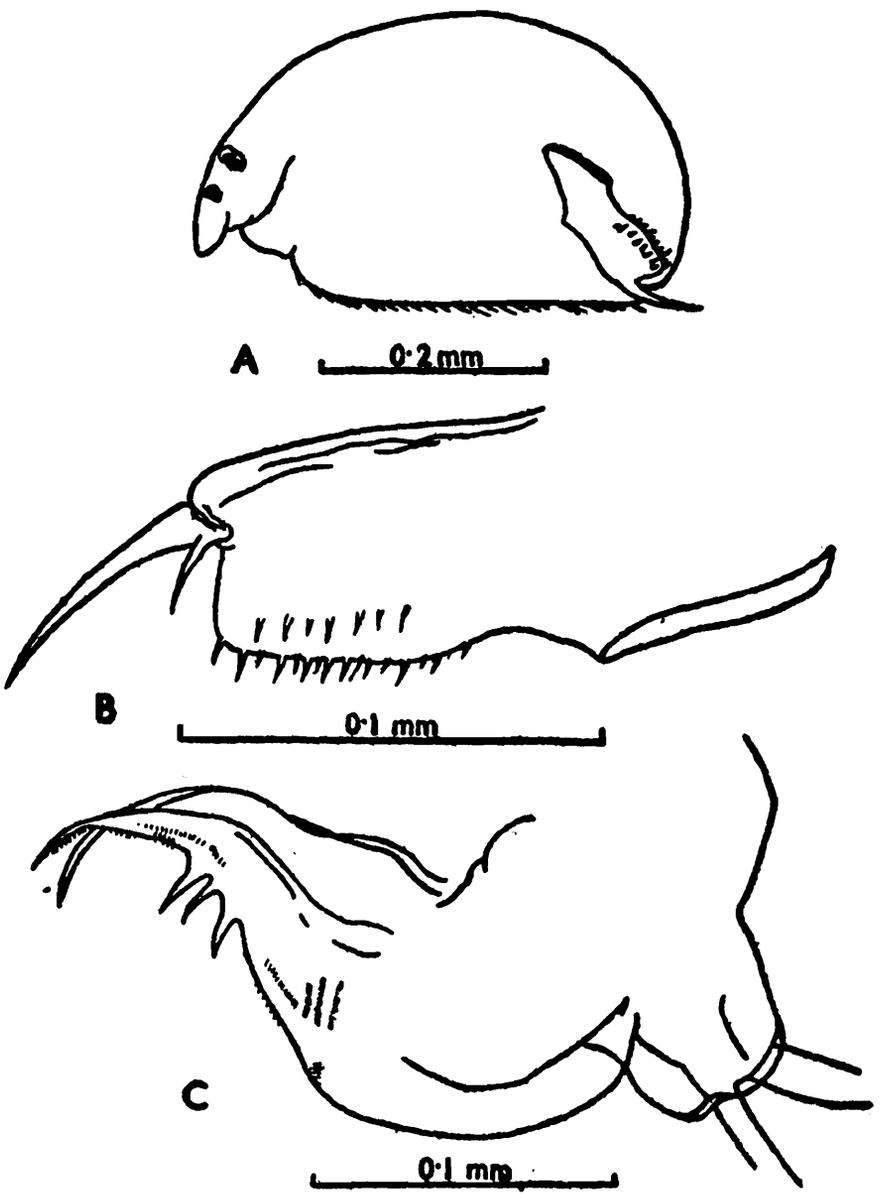
1959. *Leydigia acanthocercoides :* Brooks, *Freshwater Biology*, New York, p. 640, figs. 27, 56.

Material.—Jaipur Dist. : 2 exs., Dudu Talao, Dudu, 8.i.58. 2 exs., Julga Lake, *ca.* 21 km. S.W. of Gudha, (Coll. *S. Biswas*). *Ganganagar Dist. :* 3 exs., Suratgarh, 9.x.60, (Coll. *B. Biswas*). *Nagaur Dist. :* 18 exs., a ditch adjacent to Sambhar Lake, Gudha, 6 & 17.xi.58, (Coll. *S. Biswas*).

Measurement.—Length 0·49 mm.

Distribution.—Rajasthan : As above (first record from the area) *Elsewhere :* India : W. Bengal. Also S. E. Asia and N. America.

Remarks.—Three characters, *viz.*, the longitudinally striated valves, the keel of labrum with long cilia and the claw without basal spine, are important for recognizing this species.



TEXT-FIG. 11.—Cladocera from Rajasthan

(A) *Alona glabra* Sars, ♀, lateral view. (B) Same, postabdomen. (C) *Diaphanosoma excisum* var. *stingelini* Jenkin, ♀, postabdomen.

34. Alona rectangula Sars

(Text-figs. 13 C, D, H & 14 E,F)

1862. *Alona rectangula* Sars, *Forh. vid. Selsk.*, Christiania, p. 160.

1959. *Alona rectangula :* Brooks, *Freshwater Biology*, New York, p. 643, figs. 27,59 *e, f.*

1962. *Alona rectangula :* Hausek, *Fauna C.S.S.R.*, Prague, 16, pp. 345-347, figs. 128 A.K.

Material.—Jaipur Dist. : 1 ex., Asalpura Bund, 5.xii.58., 1 ex., Julga Lake, *ca.* 21 km. S. W. of Gudha, 8.i.58, (Coll. *S. Biswas*).

Measurement.—Length 0·39 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere :* India : W. Bengal, Kashmir (Ladakh). Also Europe and N. America.

Remarks.—Four varieties have been recognised by different authors due to the variations of shell-sculpturing and differences in the post-abdomen. But two main characters, *viz.*, the lateral fascicles long, extending beyond dorsal margin of postabdomen and not being broad toward its apex, distinguish the present species.

35. **Alona bukobensis** Welthner

(Text-figs. 13E-G)

1897. *Alona bukobensis* Welthner, *Die Cladocera Ost. Africa,* Berlin, p. 9, pls. 1 & 2, figs. 16—18.

1904. *Chydorus bukobensis :* Ekman, *Jagerskold's Swedish Expd.,* Uppsala, 26, pp. 10–14, figs. 5—10.

1916. *Alona bukobensis :* Sars, *Ann. S. Afr.* Mus., Cape Town, 15, pp. 336-537, pl. 40, figs. 3, 3*a*.

Material.—Jaipur Dist. : 1 ex., Asalpura Bund, 5. xii. 58. 2 exs., Julga Lake, *c.* 23 km. SW of Gudha, 24. xi. 58, (Coll. *S. Biswas*).

Measurement.—Length 0·40 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere :* E. and N. Africa (Egypt and Sudan).

Remarks.—These specimens have been referred to the present species due to the marginal denticles of post-abdomen being small and the sub-marginal fascicles well marked. In other characters the specimens resemble *A. rectangula* Sars.

36. **Alona intermedia** Sars var. **minor** Stingelin

(Text-fig. 12H)

1904. *Alona intermedia* Sars var. *minor* Stingelin, *Zool. Jb.* (*Syst.,*) Jena, 21, p. 351, pl. 12, fig. 22.

Material.—Jaisalmer Dist. : 1 ex., Biprasar, Ramgarh, 4.i.58, (Coll. *K. K. Tiwari & S. Biswas*).

Measurement.—Length 0·48 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere. :* S. E. Asia (Indochina).

Remarks.—The present specimen differs from *A. intermedia* Sars mainly in the absence of longitudinal striae on the shell and in having a ciliated end-claw.

37. **Alona cambouei** Guerne & Richard

(Text-fig. 12I).

1893. *Alona cambouei* Guerne & Richard, *Mem. Soc. Zool. France*, Paris, **6**, pp. 242-244, figs. 10 & 11.

1897. *Alona cambouei:* Richard, *Mem. Soc. Zool. France*, Paris, **10**, pp. 289-290, figs. 42 & 43.

1922. *Alona cambouei:* Henry, *Proc. Linn. Soc. N.S.W.*, Sydney, **47**, p. 42, pl. 8, fig. 5.

Material.—Jaipur Dist. : 1 ex., Asalpura Bund, 5. xii. 58, (Co *S. Biswas.*)

Measurement.—Length 0·45 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere :* India : W Bengal. Also Palestine, E. and S. E. Africa, Madagascar, Australia, New Zealand and S. America.

Remarks.—The important characters by which the present specimen has been assigned to this species are the presence of fascicles which are long and extend beyond the margin and the shape of postabdomen.

38. **Alona glabra** Sars

(Text-figs. 11 A, B)

1901. *Alona glabra* Sars, *Archiv. Math. Nature*, Christiania, **23**(1), pp. 55-56, pl. 9, figs. 6 & 6*a*.

1933. *Alona glabra:* Brehm, *Archiv. Hydrobiol.*, Vienna Suppl., **11**, pp. 725-726, fig. 31.

Material.—Jaipur Dist. : 1 ex., Asalpura Bund, 5. xii. 58, (Coll. *S. Biswas.*)

Measurement.—Length 0·40 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere :* Java and S. America.

Remarks.—This species is grouped in the *cambouei*-group in which posterior end of postabdomen is straight or concave, but due to this being overlooked, it is sometimes confused with *A. laevissima* Sars which belongs to the *pulchara*-group.

39. **Pleuroxus aduncus** (Jurine)

(Text-figs. 14 C, D).

1820. *Monoculus aduncus* Jurine, *Histoire des Monocles de Génevé*, Geneva & Paris, p. 152, pl. 18, figs. 8 & 9.

1909. *Pleuroxus aduncus* (Jurine): Keilhack, *Süsswasserfauna Deutsch*, (Brauer), Jena, **10**, p. 98, figs. 237 & 238.

1959. *Pleuroxus aduncus:* Brooks, *Freshwater Biology*, New York, p. 648, figs. 27, 103.

Material.—Jaipur Dist. : 2 exs., Asalpura Bund, 5. xii. 58, (Coll. *S. Biswas*).

Measurement.—Length 0·52 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere :* W. Pakistan (Brehm, 1950, Punjab), Central Asia, Europe and N. and S. America.

40. Dunhevedia crassa King

(Text-fig. 12A).

1853. *Dunhevedia crassa* King, *Pap. & Proc. Roy. Soc. van Diemens Land*, Hovert Town, **2**, p. 261.

1904. *Dunhevedia crassa :* Stingelin, *Zool. Jb.* (*Syst.*), Jena, **21**, p. 357, pl. 13, figs. 30, 31.

1916. *Dunhevedia crassa :* Sars, *Ann. S. Afr. Mus.*, Cape Town, **15**, pp. 343-344, pl. 41, figs. 3, 3*a*.

Material.—*Jaipur Dist. :* 1 ex., Asalpura Bund, 5. xii. 58, (Coll. *S. Biswas*).

Measurement.—Length 0·57 mm.

Distribution:—*Rajasthan :* As above (first record from the area). *Elsewhere :* India : S. India and W. Bengal. Also widespread : Asia, Australia, Africa, Europe and N. and S. America.

Remarks.—The present species differs from *D. serrata* Daday, of Ceylon, in the shape of the body. In the former the body is short and high with the dorsal margin much arched and in the latter more elongate and with less arched dorsal edge.

41. Chydorus robustus Stingelin

(Text-fig. 12E).

1904. *Chydorus robustus* Stingelin, *Zool. Jb.* (*Syst.*) Jena, **21**, pp. 360-361, pl. 13, figs. 35-38.

1933. *Chydorus robustus :* Brehm, *Archv. Hydrobiol.*, Stuttgart, **11**, pp. 756-757, figs. 42-44.

Material.—*Jaipur Dist. :* 1 ex., Dudu Talao, Dudu, 8. i. 58, (Coll. *S. Biswas*).

Measurement.—Length 0·39 mm.

Distribution.—*Rajasthan :* As above (first record from the area). *Elsewhere :* India : Lake Povai. Also Sumatra and Java.

Remarks.—This species is easily distinguished from other species of *Chydorus* by the presence of " Chitinschlob " or chitinous tubercles at the dorsal edge.

42. Chydorus denticulatus Henry

(Text-figs. 13J & 14 A, B)

1918. *Chydorus denticulatus* Henry, *J. roy. Soc. N.S.W.*, Sydney, **52**, pp. 480-481, pl. 42, figs. 15, 16.

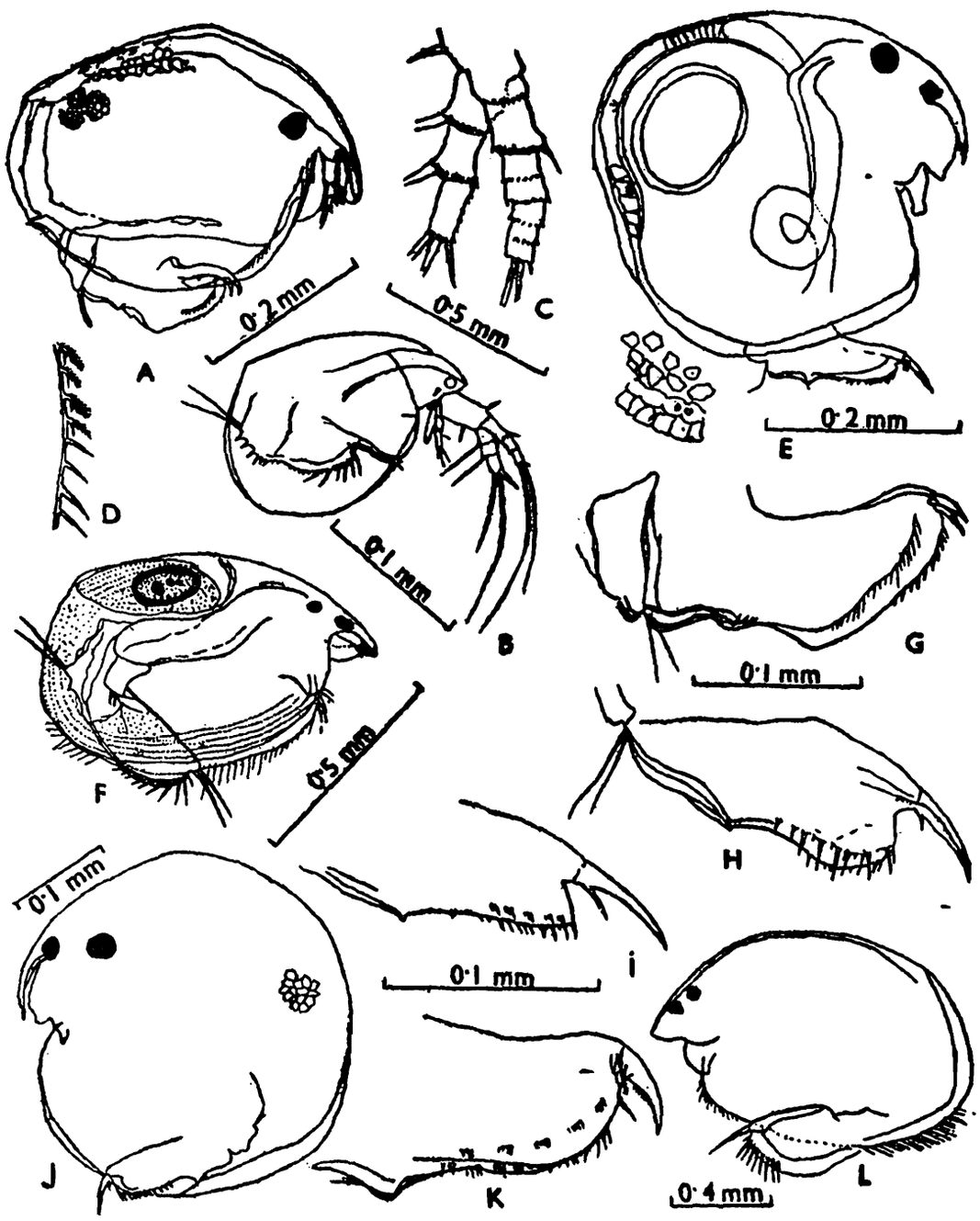
1927. *Chydorus denticulatus :* Gurney, *Proc. zool. Soc., Lond.*, London, pp. 76, 77, text-figs. 11A, B.

Material.—*Jaipur Dist. :* 2 exs., Dudu Talao, Dudu, 8. i. 59, (Coll. *S. Biswas*).

Measurements.—Length 0·45 and 0·35 mm.

Distribution.—*Rajasthan :* As above (first record from the area and from India). *Elsewhere :* Australia.

Remarks.—One example clearly shows reticular marking on the carapace as described by Gurney, the other one is like the type-specimen of Henry, without any marking.



TEXT-FIG. 12.—Cladocera from Rajasthan

(A) *Dunhevedia crassa* King, ♀, lateral view. (B) *Ilyocryptus halyi* Brady, lateral view. (C) Same, antennule. (D) Same, spines on posterior margin of shell. (E) *Chydorus robustus* Stingelin, ♀, lateral view. (Enlarged marking on shell shown separately.) (F) *Leydigia acanthocercoides* (Fischer), ♀, lateral view. (G) *Dunhevedia crassa* King, ♀, postabdomen. (H) *Alona intermedia* var. *minor* Stingelin, ♀, postabdomen. (I) *Alona cambouei* Guerne & Richard, ♀, postabdomen. (J) *Chydorus reticulatus* Daday, ♀, lateral view. (K) *Chydorus ventricosus* Daday, ♀, postabdomen, mounted on slide. (L) *Leydigia laevis* Gurney, ♀, lateral view.

Magnifications: (C), (D), to same scale. (H), (I), to same scale.

43. **Chydorus reticulatus** Daday

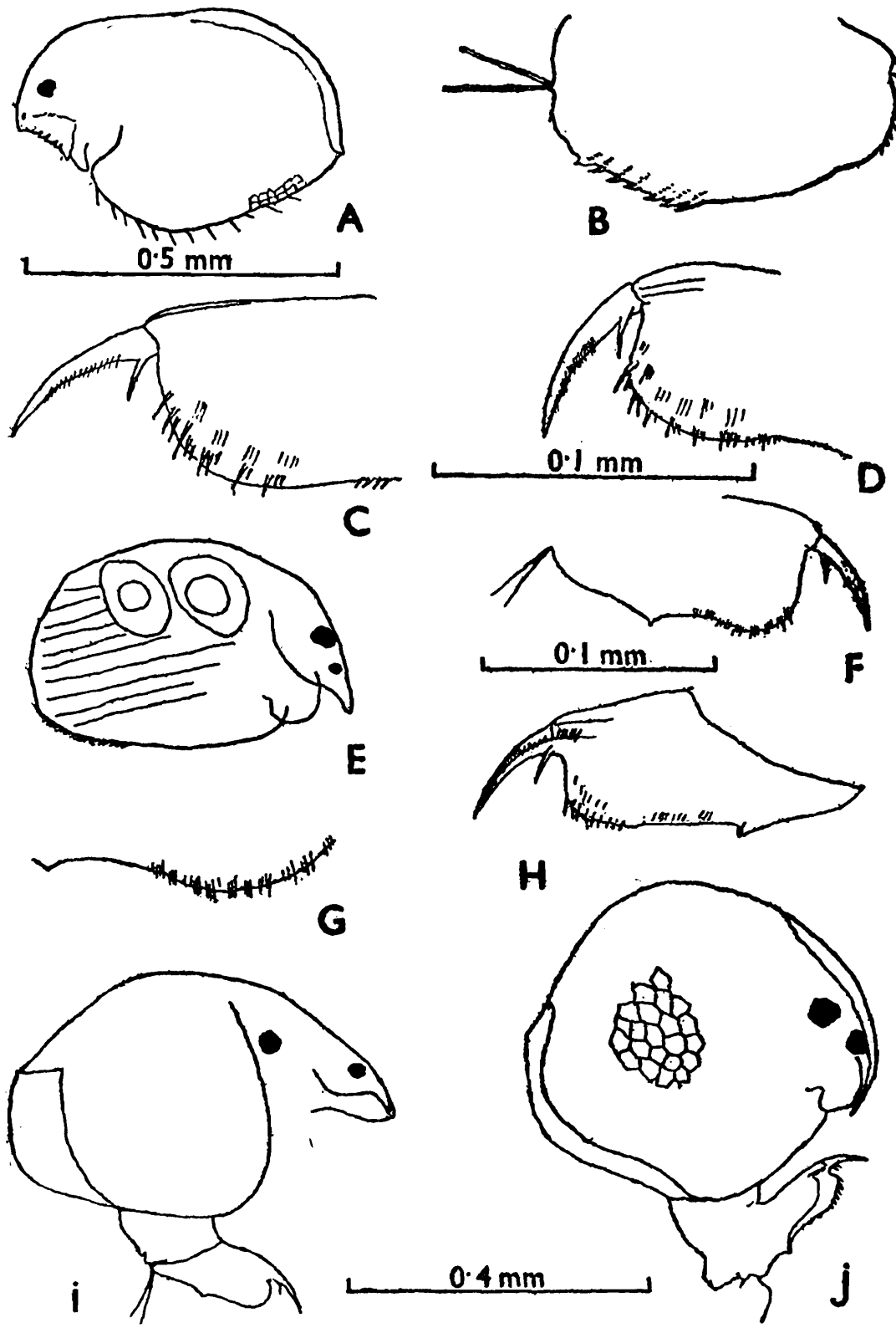
(Text-fig. 12J)

1898. *Chydorus reticulatus* Daday, *Termes. Fuzetek.* Budapest, **21**, (suppl.), pp. 27-28, figs. 9*a-d*.

1898. *Chydorus sphaericus* author var. *parvus* Daday, *Termes Fuzetek*, Budapest, 21 (suppl.), pp. 26-27, figs. 8*a-c* (synonymised by Brehm, 1933).

1916. *Chydorus parvus*: Gurney, *Proc. zool. Soc Lond.* London, 1, p. 336, pl. 1, figs. 2, 3.

Material.—Jaipur Dist. : 1 ex., Julga Lake, *ca.* 21 km. S.W. of Gudha, 24. xi. 58, (Coll. *S. Biswas*).



TEXT-FIG. 13.—Cladocera from Rajasthan

(A) *Streblocerus serricaudatus* (Fischer), ♀, lateral view. (B) Same, postabdomen. (C) and (D) *Alona rectangula* Sars, ♀, postabdomen. (E) *Alona bukobensis* Welthner, ♀, lateral view. (F) and (G) Same, postabdomen. (H) *Alona rectangula* Sars, ♀, postabdomen of another specimen. (I) *Alona intermedia* var. *minor* Stingelin, ♀, lateral view (distorted). (J) *Chydorus denticulatus* Henry, ♀, lateral view.

Magnifications : (C), (D), to same scale. (B), (F), (G), (H), to same scale. (E), (I), (J), to same scale.

Measurement :—Length 0·27 mm.

Distribution :—*Rajasthan*: As above (first record from the area and from India). *Elsewhere* : Ceylon.

Remarks .—The species *sphaericus* var. *parvus* Daday is synonymus with *C. reticulatus* Daday. *C. reticulatus* can be easily distinguished from *C. sphaericus* by the shape of the upper portion of the lip and its postabdomen. The sculpture on the shell noted by Daday is also clear in the specimen.

44. **Chydorus ventricosus** Daday

(Text-fig. 12K)

1895. *Chydorus ventricosus* Daday, *Termes Fuzetek*, Budapest, 21 (suppl.), pp. 28-29, fig. 10.

1910. *Chydorus ventricosus* : Daday, *Zoologica*, Stuttgart, 51, p. 121, pl. 6, figs. 1–4,

Material.—Jaipur Dist. : 1 ex. Dudu Talao, Dudu, 8, i. 59, (Coll. *S. Biswas*).

Measurement.—Length 0.82 mm.

Distribution.—Rajasthan : As above (first record from the area and from India). *Elsewhere* : Ceylon, Africa and S. America (Paraguay).

Remarks.—Daday described the shell sculpture of the species as punctate and indistinctly marked with hexagonal markings. But in the present specimen it is no doubt punctate, and this, under a high magnification, is seen to be spiny but no hexagonal marking is visible. The postabdomen agrees more with Daday's 1910 figure of the African specimen than with the type.

45. **Chydorus brehmi** Biswas

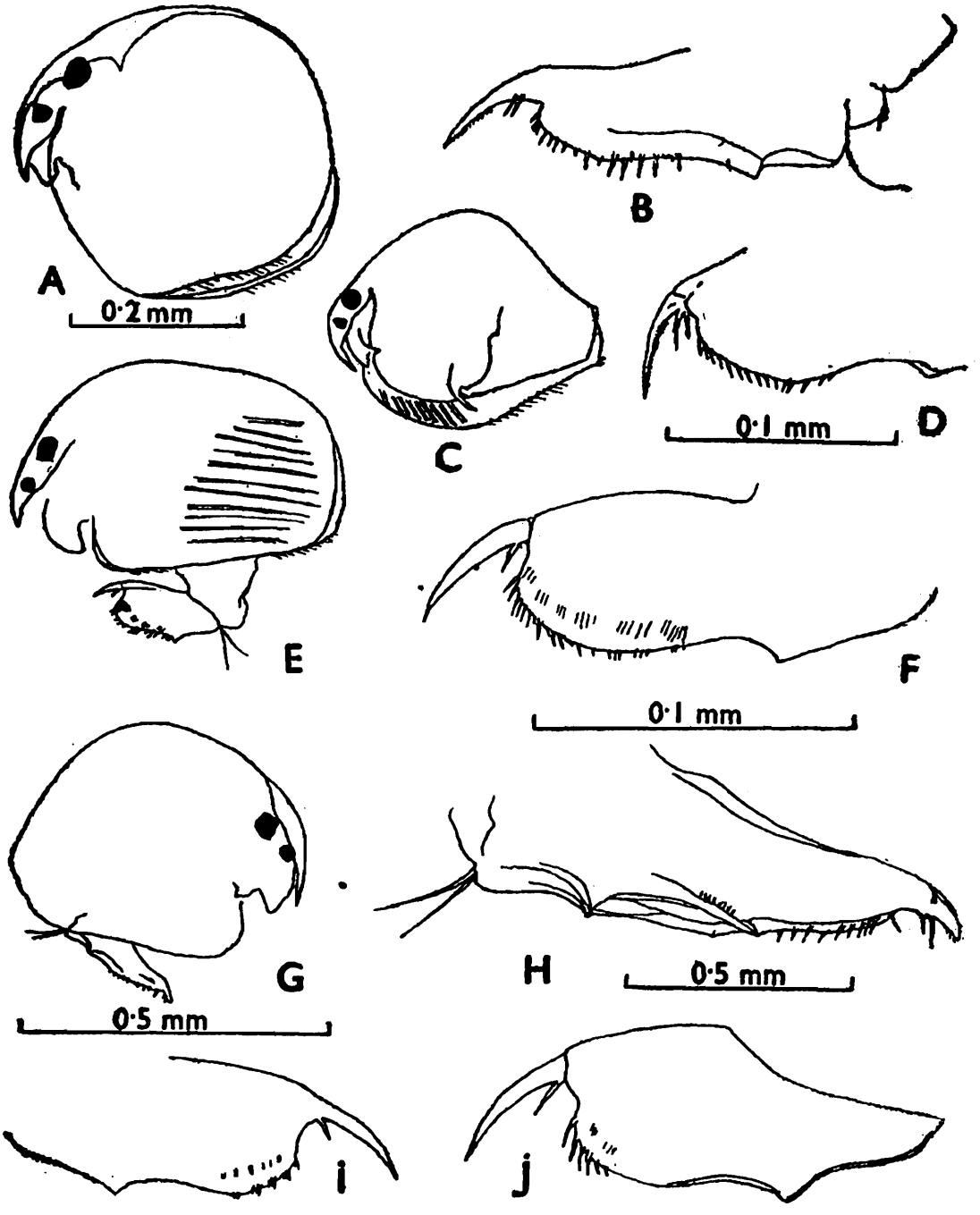
1965. *Chydorus brehmi* Biswas, *Crustaceana*, Leiden, 11(2), pp. 113-114.

Material.—Jaipur Dist. : 2 exs. (types,) Dudu Talao, Dudu, 8.i. 59, (Coll. *S. Biswas*).

Measurement.—Length 0·57, 0·59 mm.

Distribution.—Rajasthan : As above (first record from the area). *Elsewhere :* India : Nilgiri Hills.

Remarks.—Brehm (1936) doubtfully mentioned a specimen from the Nilgiri Hills.



TEXT-FIG. 14.—Cladocera from Rajasthan

(A) *Chydorus denticulatus* Henry, ♀, lateral view. (B) Same, postabdomen. (C) *Pleuroxus aduncus* (Jurine), ♀, lateral view. (D) Same, postabdomen. (E) *Alona rectangula* Sars, ♀, lateral view. (F) Same, postabdomen of another specimen. (G) *Chydorus ventricosus* Daday, ♀, lateral view. (H) Same, postabdomen. (I) and (J) *Alona rectangula* Sars, ♀, postabdomen of two other specimens.

Magnifications : (A), (E), to same scale. (C), (G), to same scale. (B), (H) to same scale. (F), (I), (J), to same scale.

VI—Note on Zoogeography of Rajasthan Cladocera

With the present scanty knowledge a comparative study of the Cladoceran fauna of the various parts of India is not possible. The more important papers on the Cladocera of the Indian Region are those of Biswas (1964) on Daphnidae from Simla Hills, Arora (1931) on the Entomostraca of Lahore, Daday (1908) on Tibet, Brehm & Waltereck (1939) and Brehm (1936) on Tibet and N. Himalaya, and Apstein (1907), Bar 1924, Gurney (1907, 1916), Daday (1898) and Brady (1886) on Ceylon. Unfortunately little or nothing is so far known about the Entomostraca of Burma.

Due to the world-wide distribution of the Cladocera there is not much zoogeographical limitation of their distribution as is usually found in certain other groups of animals. Sometimes a species may be unexpectedly discovered in a region though it might have been regarded as characteristic of a region or another rather remote. Examples of this type of discontinuous distribution are *Latonopsis occidentalis*, *L. australis* and *Simocephalus latirostris* which are known to occur only in N. America, S. Australia, and America, respectively, but have, as mentioned in the present work been found to occur in Rajasthan, India. Recently, Harding and Petkovaski (1963) have recorded the occurrence of *Latonopsis australis* from Yugoslavia also.

Regarding the zoogeographical distribution of the Rajasthan Cladocera, it generally appears to have greater affinities with the South-East Asian, Australian and African fauna, than with the Palaearctic fauna.

VII—Summary

The collections on which the present work is based were made during the surveys carried out mainly by parties of the Zoological Survey of India during the period 1957—1963 in the western, northern and central parts of Rajasthan. Collections from the eastern and southern parts are wanting.

2. To study the Cladocera fauna of the Sambhar Salt Lake region, field collections from different localities were cultured in a cemented tank, and four species namely, *Latonopsis occidentalis* Birge, *Latonopsis australis* Sars, *Moina dubia* Guerne & Richard and *Ceriodaphnia reticulata* var. *serrata* Sars, were found to occur.

3. Out of 45 species and varieties recorded here from Rajasthan, all excepting three, namely, *Daphnia carinata* King, *Latona tiwarii* Biswas and *Chydorus brehmi* Biswas, are new records from Rajasthan (and several from India), and the last two species have only recently been described by me (Biswas 1964, 1965).

4. Two ecological niches, saline and freshwater were met with namely the Sambhar Lake proper where water salinity is often high varying from 0°—3°B.E., and the freshwater sources. No species was exclusively found to inhabit the Sambhar Lake. The reason probably is that due to the addition of rain-water in the Lake, the salinity is very low in the rainy season (July to September) and during this period some freshwater fauna makes its appearance but it disappears with the increase of salinity before December.

5. Regarding the zoogeographical distribution of the Rajasthan Cladocera, it appears that it has greater affinity with South-East Asian, Australian and African fauna than with the Palaearctic.

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