

Monogenoidea on Indian Siluriform Fishes I: On a New Species and Designation of Neotypes to Some Indian Species of the Genus *Bychowskyella* Achmerow, 1952 (Monogenoidea: Dactylogyridae)

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Abstract - Well preserved monogenoid from Indian siluriform fishes in which neotypes were designated to some species of *Bychowskyella* have been described. A new species from the hill-stream fish has also been described, which is only the second species of *Bychowskyella* with two onchia.

Keywords: Monogenoidea, Siluriformes, *Bychowskyella*.

INTRODUCTION

During our investigation of monogenoids on Indian Siluriformes, it was found that the description of some species of the genus *Bychowskyella* Achmerow, 1952 was incomplete and was primarily based on illustration of hard parts alone. Also, in almost all the cases, the type-material was either in poor condition or not available for further study. With a view to designate neotypes, the present attempt was made, during which, a new species was also collected.

MATERIALS AND METHODS

Hosts were collected from River Gomti, Lucknow, River Ganga, Kanpur and adjoining areas. The worms, collected from gills, were studied mostly live under a phase contrast microscope or after being fixed in 3% formalin diluted with lukewarm water. The methods of staining, mounting, and illustrating the dactylogyrids were those described by Kritsky *et al.* (1986). The numbering of the hooks has been adopted from Kulwicz (1927). Measurements, all in μm , were taken using a calibrated micrometer following the procedure of Gusev (1976a); means are followed by the range and the number (n) of specimens measured in parentheses. Unstained, unflattened specimens mounted in glycerine were used to obtain

the measurements of the internal organs (pharynx and gonads), the body and the haptor sclerites. The terminology is that of Gusev (1976b), with two modifications; the term “thumb” and “shank” are used instead of “heel” and “handle” of hooks, respectively. Illustrations were prepared with the aid of a camera lucida attached to a phase-contrast microscope. Host name follows FishBase (Froese and Pauly, 2007).

Museums to which specimens were deposited are referred to in the text as Zoological Survey of India (ZSI), Kolkata.

1. *Bychowskyella asiatica* (Jain, 1959)

Gusev, 1961

Syns: *Sprostonia asiatica* Jain, 1959

Neosprostonia asiatica (Jain, 1959a) Jain, 1959b

Type-host: *Ompok pabda* (Hamilton, 1822),
O. bimaculatus (Bloch, 1794)
Type-locality: River Gomti, Lucknow India
(26°45'–27°N; 80°50'–81°05'E)
(2nd July, 2005).
Site: Gills.
Additional hosts: *Ailia coila* (Hamilton, 1822),
Additional locality: River Ganga Kanpur, River
Yamuna, Allahabad, River
Ganga, Patna
Specimens studied: 10
Specimens deposited: Neotype (w9278/1) in ZSI,
Kolkata.

Re-description (Fig. 1 A-J)

Body 630 (620–635; n=10) long; maximum width 100 (94–110; n=10) at mid-length. Cephalic region well developed; four cephalic lobes. Two pairs of eyespots, posterior pair larger, accessory

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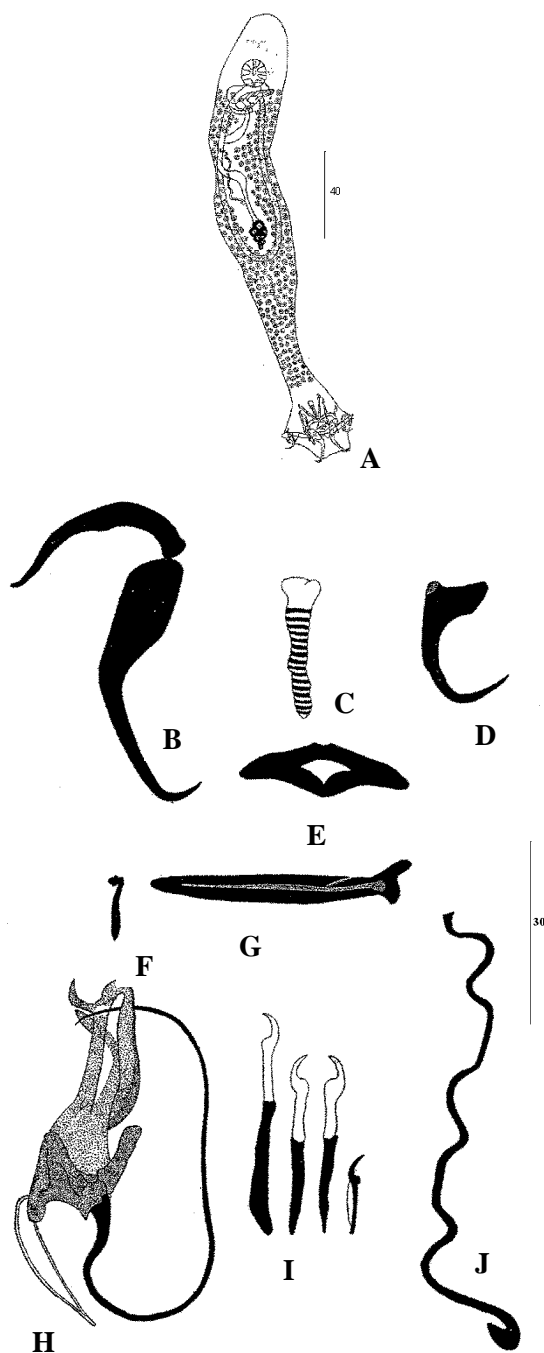


Fig. 1. *Bychowskyella asciatica* Jain, 1959 (Gusev, 1961) from *Ailia coila*. A, whole mount; B, dorsal anchor; C, onchium; D, ventral anchor; E, dorsal bar; F, sclerite; G, ventral bar; H, copulatory complex; I, hooks, J, vagina.

granules absent. Pharynx spherical, 35 (32-38; n=12) in diameter; oesophagus short to non-existent. Testis 30 (26-34; n=8) long, 20 (18-25; n= 10) wide;

vas deferens loops left intestinal caecum; Two seminal vesicle present. Two Prostatic reservoir (s) observed. Copulatory complex consists of a copulatory tube, proximally articulating accessory piece. Copulatory tube sclerotised, 100(120-160; n=13) long. Accessory piece, 74(72-76; n=13) long, proximal base with two flanges, distal end with a hairpin loop and a hook like projection. Ovary round to oval, 55(45-62; n=10) long, 40(37-47; n=10), intercaecal; oviduct, ootype, uterus not observed. Two Seminal receptacle(s) observed. Tubular vaginal armament 87 (85-89; n= 6) long, corresponding to the length of cirrus. Vitellaria dense, throughout trunk, except absent in regions of reproductive organs.

Haptor 90(85-98; n=10) long, 95 (93-97; n=10) wide. Dorsal anchor inner length 45(42-47; n=15), recurved point 7 (6-8; n=15) long, patch 30 (27-33; n=10). Ventral anchor inner length 20 (18-22; n= 10), outer length 20 (17-23; n= 10) recurved point 10 (8-13; n= 10). Dorsal bar, 31(26-34; n=14) long, Ventral bar, 47(45-49; n=13) long. Onchium screw-shaped, 24(22-26; n=8) long. Seven pairs of hooks; three pairs consisting of a shank of 2 subunits, rounded thumb, delicate point with dimensions as follows: pairs 1 and 4, 16-19(n=15); pair 3, 20-25(n=16); pair 2, 6, 5 and 7 and larval type: 13-15(n=12) long.

Remarks

Late Prof. Jain only made temporary preparations and did not preserve the type specimens of *B. asciatica*, (personally communicated to N. Agrawal) and assignment of a specific name to present specimens is depended on comparison with the published account only. The original drawings strongly suggest conspecificity with our collection. Thus, a neotype for *B. asciatica* was selected and designated from present specimens from Gomti River, Lucknow, India. Our findings of *B. asciatica* on *A. coila* represented a new host record.

2. *B. kanpurensis* Agrawal, Shukla and Vishwakarma, 1996

Type-host
Type-Locality
Site:

Ompok bimaculatus (Bloch, 174)
Ganges river, Kanpur
Gills

Present record and locality *Ompok bimaculatus* (Bloch, 174), Ganges river, Kanpur and *Ailia coila*, River Ganga, Kanpur.
 Specimens studied: 10
 Specimens deposited: Neotype (w 9279/1) in ZSI, Kolkatta.

Re-description (Fig. 2 A-J)

Body 600 (560-620; n=10) long; maximum width 80 (75-83; n=10) at mid-length. Cephalic region well developed; four cephalic lobes. Two pairs of eye spots, posterior pair larger, accessory granules absent. Pharynx spherical, 27 (25-30; n=12) in diameter; oesophagus short to non-existent. Testis 27 (25-28; n=8) long, vas deferens loops left intestinal caecum; seminal vesicle a sigmoid dilation of vas deferens. Prostatic reservoir (s) not observed. Copulatory complex consists of a copulatory tube, proximally articulating accessory piece. Copulatory tube sclerotised, 36 (34-40; n=10) long. Accessory piece, 36 (34-38; n=10) long. Ovary round to oval, intercaecal; oviduct, ootype, uterus not observed. Seminal receptacle not observed. Vaginal armament tubular 28 (26-30; n=6). Vitellaria dense, throughout trunk, except absent in regions of reproductive organs.

Haptor 90 (85-93; n=10) long, 100 (96-105; n=10) wide. Dorsal anchor: inner length 37 (35-38; n=8) recurved point 5 (3-6; n= 10) long, Patch 27 (25-29; n=10), Dorsal connective bar, 31(25-33; n=10)long, Ventral bar, 29 (26-30; n=10) long, Ventral anchor inner length 15 (13-16; n=10) long; ventral anchor outer length; 22 (20-25; n=10) long, recurved point; 19 (17-20; n=10) long, Onchium 20 (18-22; n=10) long, Sclerite, 10 (8-13; n=10) long. Seven pairs hooks. Three pairs of hooks consists of a shank of 2 subunits, rounded thumb, delicate point with dimensions as follows: pairs 1st; 36; 2nd, 34; 3rd 37; rest of larval type: 2nd, 6th, 5th and 7th; 11 long.

Remarks

We have found the same species from the type host and locality as well as from a different host and locality. *B. kanpurensis* possess an unusually long recurved point of ventral anchor, a forcipulate accessory piece through which the copulatory tube passes, a small thread-shaped sclerite and spatulated onchium. These findings were lacking in the original description, which have been added in the present redescription.

Only temporary preparations were made in the earlier study and type specimens were not preserved. Therefore, assignment of a specific name to present specimens is depended on comparison with the published account only. The original

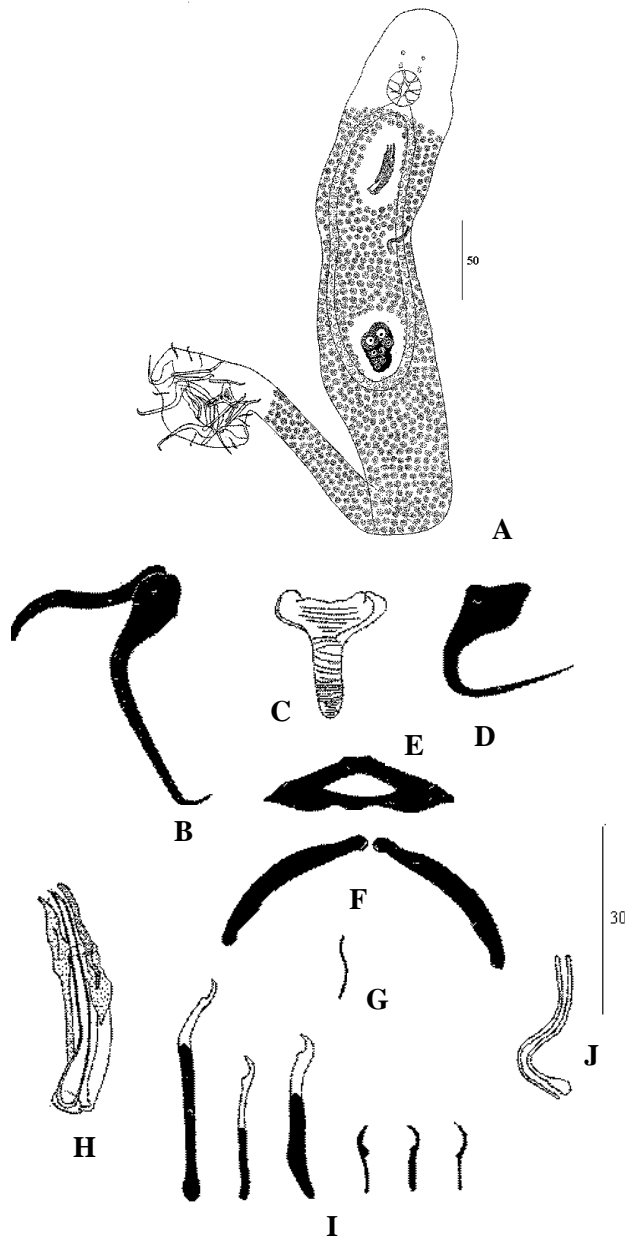


Fig. 2. *Bychowkyella kanpurensis* Agrawal, Shukra and Vishwakarma, 1996 from *Ailia coila*. A, whole mount (dorsal view); B, dorsal anchor; C, onchium; D, ventral anchor; E, dorsal bar; F, ventral bar; G, sclerite; H, copulatory complex; I, hooks; J, vagina.

drawings strongly suggest conspecificity with our collection. Thus, a neotype was selected and designated from present specimens from Ganga River, Kanpur, India.

3. *Bychowskyella lucknowensis* Agrawal and Sharma, 1989

Type-host:	<i>Eutropiichthys vacha</i> (Hamilton, 1822) (Siluriformes: Schilbeidae).
Infection site:	Gills.
Type-locality:	River Gomti, Lucknow, India
Present record and locality:	<i>Eutropiichthys vacha</i> (Hamilton 1822), River Gomti, Lucknow, India.
No. of hosts examined:	20
No. of hosts found infected:	15
Specimens deposited:	Neotype (w 9280/1) in ZSI, Kolkatta.

Redescription (Fig. 3 A-H)

Body 365 (360-370; n=10) long; maximum width 105 (100-108; n=10) at mid-length. Cephalic region well developed; four cephalic lobes. Two pairs of eye spots, posterior pair larger, accessory granules absent. Pharynx spherical, 20 (18-22; n=12) in diameter; oesophagus short to non-existent. Testis 60 (55-65; n=8) long, 34 (32-36; n=8) wide; vas deferens loops left intestinal caecum; seminal vesicle a sigmoid dilation of vas deferens. Prostatic reservoir (s) not observed.

Copulatory complex consists of a copulatory tube, proximally articulating accessory piece. Copulatory tube sclerotised, 83 (80-85; n=10) long. Accessory piece, 68(65-70; n=13) long. Ovary round to oval, long, intercaecal; oviduct, ootype, uterus not observed. Seminal receptacle not observed. Vaginal armament not observed. Vitellaria dense, throughout trunk, except absent in regions of reproductive organs.

Haptor 75 (70-80; n=10) long, 175(170-180; n=10) wide. Dorsal anchor: inner length 62 (60-65; n=15), recurved point 7 (6-8; n=10) long, Patch 38 (35-40; n=10). Ventral anchor: inner length 32 (30-35; n=15), recurved point 15 (12-16; n=10) long. Dorsal connective bar 54 (50-55; n=10) long, Ventral bar 54 (52-56; n=10) long. Seven pairs hooks; three pairs with dilated proximal handles, others of larval type with dimensions as follows: pairs 1 and 4, 42-44 (n=15); pair 3, 34-36 (n=16);

pair 2, 6, 5 and 7 larval type: 16-17(n=12) long.

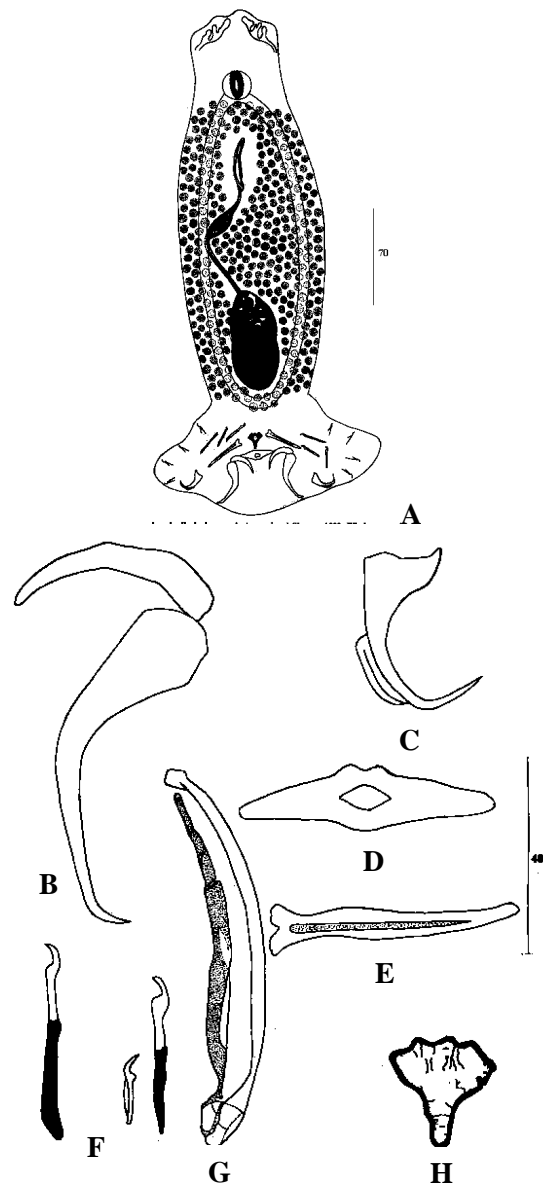


Fig. 3. *Bychowskyella lucknowensis* Agrawal and Sharma, 1989. A, whole moment (dorsal view); B, dorsal anchor; C, ventral anchor; D, dorsal bar; E, ventral bar; F, hooks; H, copulatory complex H, onchium.

Remarks

Dorsal bar is expanded with a fenestration in the middle, rather than expanded wing like as shown in the theoretical original diagram. Neotype has been designated in the present study as they were not preserved in the earlier study.

4. *Bychowskyella idolus* n.sp.

Present host:	<i>Glyptothorax</i> spp.(Hamilton, 1822).
Present locality:	River Song, Dehradun, India (26°45'–27°N; 80°50'–81°05'E)
Site:	Gills.
Specimens studied:	10
Specimens deposited:	Holotype (w 9281/1); paratype (w 9282/1-w 9284/1) in ZSI, Kolkatta.

Description (Fig. 4 A-J)

Body 450 (440-460; n=10) long; maximum width 160 (155-165; n=10) at mid-length. Cephalic region well developed; four cephalic lobes. Assessory granules are scattered throughout the length of body. Two pairs of eye spots, posterior pair larger, accessory granules absent. Pharynx spherical, 34 (31-35; n=12) in diameter; oesophagus short to non-existent. Testis 27 (26-29; n=8) long, 20 (18-24; n=8) wide; vas deferens loops left intestinal caecum; seminal vesicle a sigmoid dilation of vas deferens. Prostatic reservoir (s) not observed. Copulatory complex consists of a copulatory tube, proximally articulating accessory piece. Copulatory tube sclerotised, 20(18-22; n=13) long. Accessory piece, 22 (20-25; n=13) long, proximal base with two flanges, distal end with a hair pin loop and a hook like projection. Ovary round to oval, 55(45-62; n=10) long, 40(37-47; n=10), intercaecal; oviduct, ootype, uterus not observed. Seminal receptacle and vaginal armament not observed. Vitellaria dense, throughout trunk, except absent in regions of reproductive organs. Haptor 90 (85-93; n=10) long, 95 (92-98; n=10) wide. Dorsal anchor: inner length 45(40-48; n=15), recurved point 7(6-8; n=15) long, Patch 30 (27-33; n=10), Ventral anchor inner length 20 (18-23; n=10), Dorsal connective bar, 31(28-32; n=14) long, Ventral bar, 47(45-49; n=13) long, Dorsal onchium, 50 (45-55; n=8) long. Ventral onchium 26 (25-28; n=8) Seven pairs hooks. Three pairs consist of a shank of 2 subunits, rounded thumb, delicate point with dimensions as follows: pairs 1, and 4, (16-19; n=15); pair 3, (20-25; n=16); pair 2, 6, 5 and 7 larval type, 13-15(n=12) long.

Remarks

The present species is characterized by the presence of two onchia and is only the second species of *Bychowskyella* with two onchia after

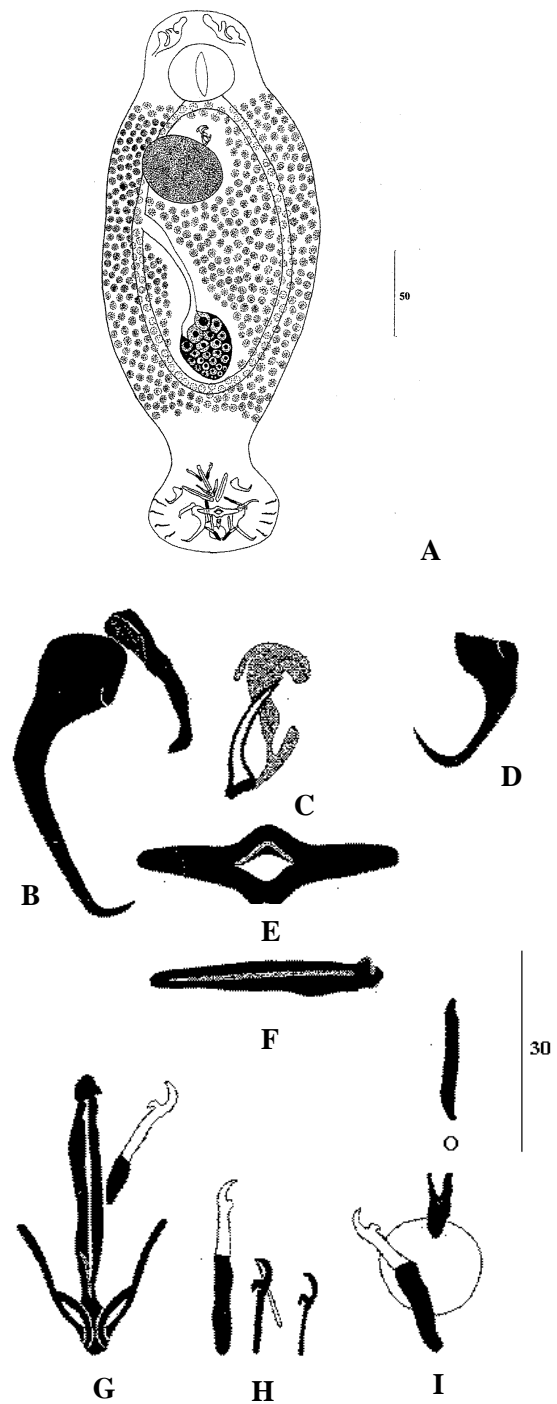


Fig. 4. *Bychowskyella idolus* sp.n. from *Glyptothorax* sp. A, whole mount, dorsal view; B, dorsal anchor; C, copulatory complex; D, ventral anchor; E, dorsal bar; F, ventral bar; G, ventral onchium; O, sclerite; H, hook; I, dorsal onchium and hook.

B. sisoris Lim, 1991 from *Glyptothorax major*. It differs from *B. sisoris* in the morphology of dorsal onchium (with a rectangular shield, in *B. sisoris* but with a circular shield in *B. idolus*). It is further different from *B. sisoris* in the shape of ventral anchors (prominent 'sliver' like projection at one end of ventral anchor in *B. sisoris*; absent in *B. idolus*). It also resembles closely *B. glyptothoraci* (Ma et al., 1983) Lim et al. (2001) from *Glyptothorax sinense* in the shape of copulatory complex, anchors and bars but differs from *B. glyptothoraci* in having two onchia. (only one 'W-shaped' onchium is present in *B. glyptothoraci*. Ma et al. (1983) proposed *Neobychowskyella* to accommodate a new species, *N. glyptothoraci*. Lim et al. (2001) synonymised *Neobychowskyella* Ma et al. (1983) with *Bychowskyella* Achmerov (1952) on the ground that the diagnostic characteristics (Presence of two onchia) used to differentiate *Neobychowskyella* are not generic level criteria. Lim et al. (2001) further made an erroneous observation that *Neobychowskyella* posses two onchia. However, the original figures and description of Ma et al. (1983) clearly shows the presence of a single "W"-like apparatus for attachment and not two onchia, as described by Lim et al. (2001).

DISCUSSION

Lim et al. (1991) have tried to link the number of onchia with the evolution of *Bychowskyella* species. Though many workers in the recent past have doubted the concept of 'growth of complexity' during the course of evolution, it is still the intuitive consensus that seems obvious to most evolutionists. The fossil records of Claridae, Siluridae and Sisoridae did not support her case either. First fossil record of Claridae extends to Lower-middle Eocene and according to Froese and Pauly (2007), first fossil record of siluridae and sisoridae extends to upper Miocene, and Pliocene respectively. Their representatives, however, have no onchium, one onchium and two onchium respectively. Claridae with no onchium suggests that most early progenitor hosts of *Bychowskyella* species were without onchium, it arose later only during the course of evolution. This is supported by the fact that the period when sisoridae originated

was the period of such conditions, which necessitated the appearance of onchium. It is further supported by the fact that there are only 2 species with two onchia out of 30 species of *Bychowskyella* described so far suggesting that this is more characteristic of one which is appearing rather than one which is disappearing. Gusev (1977) suggested that onchia might be overlooked in badly preserved specimens. The absence or presence of onchia seems correlated to host families; two onchia with the members of mountainous fishes. It became apparent that description of some of the earlier *Bychowskyella* species from India is incomplete as it was based on illustration of hard parts alone, others have been misidentified as new species based on minor morphological variations necessitating their verification. Preservation of specimens is very important for a careful study of the species. They should be deposited in a museum for future studies. Misidentification and misinterpretation of various species occurs, owing to the dearth of the preserved specimens. Since, the original specimens were not preserved, for the future monogenoidean studies, hence designation of neotypes was done in the present study.

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