

A REVIEW OF THE GENUS *SCHISTURA* IN PAKISTAN  
WITH DESCRIPTION OF NEW SPECIES AND SUBSPECIES  
(PISCES, COBITIDAE, NOEMACHEILINAE)

by

MUHAMMAD R. MIRZA

*Government College, Department of Zoology, Lahore, Pakistan*

and

TEODOR T. NALBANT & PETRU M. BANARESCU

*Institute of Biology, Department of Taxonomy and Evolution,  
Spl. Independenței 296, 77748 București, Romania*

ABSTRACT

The genus *Schistura* in Pakistan is reviewed: 20 species (of which 8 are new) and 1 subspecies (new) arranged in 3 species groups are recognized.

RÉSUMÉ

Un aperçu du genre *Schistura* en Pakistan est donné: on y reconnaît 20 espèces (dont 8 nouvelles) et 1 sous-espèce (nouvelle) placées en 3 groupes d'espèces.

INTRODUCTION

A great number of noemacheiline loaches are known from various areas of Pakistan (Günther, 1889; Zugmayer, 1912; Hora, 1923, 1933 a & b; Ahmad & Mirza, 1963; Banarescu & Mirza, 1965, 1972; Mirza, Banarescu & Nalbant, 1969, 1970; Mirza, 1972, 1973, 1975, 1976; Omer & Mirza, 1975; Mirza & Awan, 1976; Ahmad, Khan & Mirza, 1976). Their number is constantly increasing, almost each collection revealing new species.

Until recently, most noemacheiline loaches described, and all those recorded from Pakistan were included within the composite genus *Noemacheilus*. In some recent papers, however, several subgenera are recognized and it was suggested that most of these actually deserve full generic status. Since a critical comparative study of most species of the subfamily is in an advanced stage ("The system of Noemacheilinae", Banarescu & Nalbant, in preparation), it is already possible to split this too large genus into several, more natural units.

The noemacheiline loaches from Pakistan belong to four genera: *Noemacheilus* (up to now only *N. corica*), *Acanthocobitis* (only *A. botia*), *Triplophysa* (i.e., the species with High Asian affinities: *griffithi*, *brabui*, *naziri*, *stoliczkai*, *akhtari*, *choprai*) and *Schistura*, which includes most species from the Indus basin and from the inland drainages in the western areas of Pakistan.

The present paper deals only with the species of *Schistura*. All are reviewed, supplementary data about their distribution, and main distinctive features of each of them are mentioned, the new species being described and illustrated.

MATERIAL

Most specimens on which this study is based were collected in Pakistan by the first author and his collaborators. The holotypes and some of the paratypes belong to the collections of the Institute of Biology (Institutul de Stiințe Biologice) in Bucharest (ISBB); other paratypes are in the Zoologisch Museum, Amsterdam (ZMA) and in the private collection of the first author. Comparative material was received on loan from the British Museum (Natural History) (BMNH) and from Dr. P.-G. Bianco, L'Aquila, Italy.

SYSTEMATIC ACCOUNT

Genus *Schistura* McClelland, 1839

Type-species: *Cobitis (Schistura) rupecula* McClelland, by subsequent designation (Jordan, 1919: 195).

A complete diagnosis and definition of this genus, the most complex and most variable within the subfamily, and also the largest or second largest, will be given in another paper (Banarescu & Nalbant, in preparation); its main characters were already mentioned in certain previous publications (Banarescu & Nalbant, 1966, 1968, 1974).

A difficult problem is the nomenclatorial status of the genus. It was proposed by McClelland (1839) as subgenus of *Cobitis*. The original diagnosis is incomplete; some characters mentioned apply to botiine, others to noemacheiline loaches (e.g. "with or without suborbital spines"). McClelland (: 440-443) lists the following species as *Schistura*: *montana*, *zonata*, *rupecula*, *ocellata*, *savona*, *punctata*, *subfusca*, *scaturigina*. All, except perhaps *ocellata* (being unidentifiable) are Noemacheilinae; the first three and last two taxa are recorded in previous papers of the authors as *Schistura*. Much confusion arises from the fact that in the short diagnosis of the species, McClelland (: 306-309), lists as *Schistura* some more species besides the eight mentioned above: *dario*, *geta* (misprint for *geto*) *grandis*, *balgara*, *aculeata*; the three first ones actually are Botiinae. But in the main text (: 443-445) these species are listed under *Cobitis* (*dario* and *geta*) and *Botia* (*grandis*). McClelland (: 443) even writes:

"So many divisions of the Loaches have been proposed, and so many names to designate those divisions, that I feel some doubt in recommending the generic term *Hymenphysa* for the following three species, which are distinguished from all others by the presence of an abdominal natatory bladder, separated into lobes by a longitudinal septum". Follows the description of *Cobitis dario*, *C. geta* and *Botia grandis*.

Modern authors are unanimous in accepting that in these few lines, McClelland established the taxon *Hymen(o)physa*, presently accepted as a valid subgenus of *Botia*.

Among the authors from the 19th century, Valenciennes (1846: 9-12) considers *Schistura* as a synonym of *Cobitis*, and Bleeker (1863: 2) as a synonym of *Botia*. These viewpoints cannot be accepted, since the name *Cobitis* is restricted to the *taenia* group of species and on the other hand, no species presently assigned to *Botia* are listed

under *Schistura* in McClelland's main text (: 439-445); on the contrary, he clearly assigned the species *dario*, *geta*, and *grandis* to *Hymen(o)physa*. We therefore accept Jordan's (1919: 195) designation of *rupecula* (one of the eight species ascribed by McClelland to this subgenus) as generotype.

Several groups of species can be recognized within *Schistura*. The type-species, *rupecula*, belongs to a group characterized by: depressed head; scaled body; complete or almost complete lateral line; truncate, emarginate, or slightly forked caudal fin; apparently no sexual dimorphism; toothlike prolongation of the upper jaw (processus dentiformis) strongly developed and a corresponding incision on the lower jaw. This group includes mainly species from the Ganges and Brahmaputra basins, Burma, the rivers of Thailand and the southern parts of East Asia, northwards to the upper Yangtze River; it does not occur in Pakistan and apparently not elsewhere in the Indus basin.

The species from Pakistan belong to the following three groups:

#### Group *alepidota-pakistanica*

The species of this group are characterized by: a large size; depressed head; totally scaleless body; no sexual dimorphism; rather long lateral line, reaching at least to below dorsal fin; truncate or emarginate caudal fin; strongly developed processus dentiformis and usually a corresponding incision on the lower jaw.

The group is endemic to the Indus basin in Pakistan and Afghanistan; it differs from the *rupecula* group above all in the absence of scales and usually shorter lateral line (in the *rupecula* group this is always almost complete). It includes four species:

#### ***Schistura alepidota*** (Mirza & Banarescu, 1970). Fig. 2.

*Nemacheilus rupicola inglisi* (non Hora); Ahmad & Mirza, 1963: 75 (Madyan River, Swat River basin, Pakistan).

*Noemacheilus rupecola alepidotus* Mirza & Banarescu, in Mirza, Banarescu & Nalbant, 1970: 55, fig. 10 (Madyan River; further localities: Marghzar, Mingoara, Shiner, all in the Swat River basin; not Panjar, Jhelum River basin).

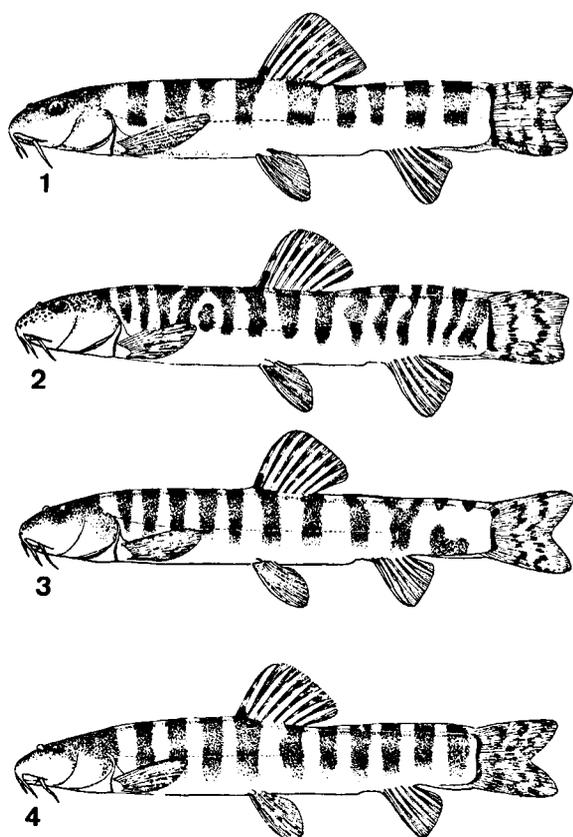


Fig. 1. *Schistura pakistanica*, ISBB 2005, holotype, from the Zhob River, Hindubagh. Fig. 2. *S. alepidota*, ISBB 1356, holotype, from the Madyan River, Swat drainage. Fig. 3. *S. nalbanti*, ISBB 2490, holotype, from the Jhelum River, Rawlakot, Azad Kashmir. Fig. 4. *S. paludani*, Zoological Museum Copenhagen, Pisces, coll. no. 2801, holotype, from the Pech River, tributary of the Kabul River at Gusalek, Afghanistan.

The species is characterized by: 12-15 crossbars ( $M = \text{ca. } 13 \text{ or } 14$ ); truncate caudal fin; a rather well-developed adipose crest in the posterior part of the caudal peduncle; lateral line of variable length, reaching below dorsal fin, above anal fin or to an intermediate point; large roundish spots on upper face of head; a continuous stripe on the caudal fin base (of irregular, more or less undulated shape and variable width); processus dentiformis not notched medially.

Range. — The species was described from the Madyan River and three other localities in the Swat River basin; this is a tributary of the lower Kabul River, a right tributary of the Indus. Further specimens were obtained later from two more

localities: Hangu on the Kohat Toi River (a right tributary of the Indus south of the Kabul River) and Abbottabad on the Dor River (a left tributary of the Indus, its confluence lying east-northeast from that of the Kabul River) (map 1). Probably the species also occurs in the lower Kabul River, as well as in the Indus proper, at least between the confluences of Dor, Kabul, and Kohat Toi rivers. The few specimens available from Hangu and Abbottabad are small; we therefore could not make out if there are differences with those from the Swat River basin.

***Schistura pakistanica*** (Mirza & Banareescu, 1969). Fig. 1.

*Noemacheilus pakistanicus* Mirza & Banareescu, in Mirza, Banareescu & Nalbant, 1969: 97, figs. 1-3 (Hindubagh, now Muslimbagh, Zhob River basin).

*Noemacheilus rbadineus* (non Regan) Mirza, 1972: 173 (Fort Sandeman, now Zhob City, Zhob River basin).

*Noemacheilus cristatus* (non Berg) Mirza, 1975: 160, 170-171.

This species has 9-10 broad crossbars, a truncate or slightly emarginate caudal fin with roundish lobes; upper face of head uniformly dark, without distinct spots; stripe on the base of the caudal fin continuous, narrower than in *alepidota*, and either complete (extending from the dorsal to the ventral side) or developed in the middle only; processus dentiformis in some specimens notched in the middle; lateral line almost complete, its end always closer to caudal fin base than to end of anal fin; an adipose keel on the caudal peduncle. Comparison of the original description of this species with that of *S. alepidota* reveals some differences in body proportions, above all the longer snout in *pakistanica*.

Besides the holotype and paratypes, a few more specimens were obtained, all from Zhob City, 77.0-98.0 mm standard length.

Range. — This species is probably endemic to the Zhob River, a tributary of the Gomal River, a right tributary of the middle Indus, south of the Swat, Kohat Toi and Kurram rivers (map 1).

***Schistura nalbanti*** (Banareescu & Mirza, 1972). Fig. 3.

*Noemacheilus rupecola alepidotus* Mirza & Banareescu, in Mirza, Banareescu & Nalbant, 1970: 55 (partim: Panjar,

Jhelum River basin; not the type-locality and not other localities in the Swat River basin).  
*Noemacheilus alepidotus nalbanti* Banarescu & Mirza, 1972: 121, figs. 1-2 (Rawlakot, Azad Kashmir, Jhelum River basin).

This loach was originally described as a subspecies of *alepidota*, the original description mentioning a single differential character: fewer crossbars. Actually, a critical comparison of the four forms of the *alepidota* group revealed more differences, *nalbanti* being even closer to *S. paludani* from the Kabul River basin than to *alepidota*.

*S. nalbanti* has 10-12, rarely 13 crossbars (average value 11 in both the Rawlakot and Panjar populations); the caudal fin is evidently emarginate; the upper face of the head is uniformly dark and unspotted; the lateral line is shorter, usually not reaching near the caudal fin base; the processus dentiformis is much stronger than in both *alepidota* and *pakistanica*; the adipose crest on the caudal peduncle is on the contrary weaker than in these two species; the dark brown stripe on the base of the caudal fin is not continuous as in the two preceding species, but always divided in a dorsal spot, and a much longer, lower fragment that extends from above the middle of the fin to the ventral side.

Range. — Up to now, *S. nalbanti* is known only from the basin of the Jhelum River, a northern tributary of the Sutlej River, left tributary of the

middle Indus; it is the easternmost species of the group (map 1).

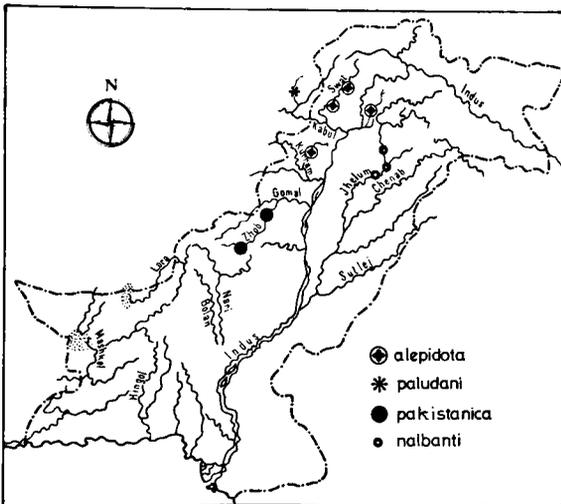
**Schistura paludani** (Banarescu & Nalbant, 1966). Fig. 4.

*Noemacheilus sargadensis paludani* Banarescu & Nalbant, 1966: 167, figs. 9-10, pl. XXI figs. 1-2 (Pech River, Kabul River basin, at Gusalek, northeastern Afghanistan).

This loach was initially described as a subspecies of the little-known (and by the time not available) *sargadensis* from southeastern Iran. We recently received specimens of *sargadensis* from the Kul River, Iran, collected by Dr. P.-G. Bianco. This river lies close to the Sargad River, type-locality of *sargadensis*. These specimens perfectly correspond to the original description of *sargadensis* (A. M. Nikolski, 1900: 415) and also to the illustration of the type-specimen by Berg (1949 b: 841, fig. 55). The true *sargadensis* has a scaled body, a more deeply emarginate (almost forked) caudal fin, a feeble processus dentiformis, and irregular crossbars; it belongs to another species group of *Schistura*.

*S. paludani* is a distinct species of the *alepidota* group; it has 8-14 crossbars, an emarginate caudal fin, a rather strong adipose crest on the caudal peduncle, a strong processus dentiformis; the lateral line reaches to above the anal fin, being interrupted in several places between the dorsal and anal fins; the dark stripe on the caudal fin base is continuous.

*S. paludani* is closest to *S. nalbanti*; both species have, contrary to *alepidota* and *pakistanica*, an emarginate caudal fin. It differs from *nalbanti* in having a stronger adipose crest, a continuous dark stripe on the caudal fin base and in different body proportions, e.g.:



Map 1. Distribution of *Schistura alepidota*, *S. paludani*, *S. pakistanica* and *S. nalbanti*.

|                           | <i>paludani</i>    | <i>nalbanti</i> |
|---------------------------|--------------------|-----------------|
| Predorsal distance        | 48.1-50.5% of SL   | 51.0-55.8%      |
| Preventral distance       | 50.1-52.1% of SL   | 51.3-55.8%      |
| P-V distance              | 28.6-30.8% of SL   | 29.0-32.2%      |
| Caudal peduncle           | 15.6-17.0% of SL   | 12.7-15.7%      |
| Length of pectoral fin    | 16.6-21.0% of SL   | 18.6-22.2%      |
| Length of ventral fin     | 14.9-18.5% of SL   | 15.9-19.1%      |
| Length of caudal fin      | 18.3-20.6% of SL   | 18.8-24.6%      |
| Maxillar barbel           | 4.6- 7.6% of SL    | 5.9- 8.8%       |
| Eye diameter              | 12.5-17.1% of head | 14.5-21.0%      |
| Eye diameter interorbital | 50.0-56.0% of      | 57.5-66.7%      |

Other body proportions (depth, least depth, head length, etc.) are similar in both species.

Range. — This species is up to now only known from the Pech River in the basin of the Kabul River, northeastern Afghanistan near the frontier with Pakistan (map 1). Since the Kabul River also flows through Pakistan, the range of *paludani* probably includes part of this country too.

**Group kessleri-lindbergi**

The species of this group are characterized by: a small size; rather compressed head; body totally devoid of scales, or with a quite reduced scaled area on the caudal peduncle; lateral line short, not reaching to the middle of the body; caudal fin emarginate to slightly forked; processus denticiformis reduced; no sexual dimorphism; dorsal fin with seven branched rays.

The range of this group extends from Turk-

menia and eastern Iran to the Baluchistan Province and the Indus basin in Pakistan. It includes two species, both also found in Pakistan (map 2).

**Schistura kessleri kessleri** (Günther, 1889).

Figs. 5-8.

*Nemachilus kessleri* Günther, 1889: 109 (Nushki, Pishin Lora River basin, Afghanistan); Hora, 1933a: 187, fig. 2, pl. V fig. 3 (Nushki; Quetta and Pishin districts in northern Baluchistan); Berg, 1949a: 877, fig. 623 (northern Baluchistan, eastern Iran and Kushka River).

*Noemacheilus kessleri*; Banarescu & Nalbant, 1966: 171, fig. 11 and pl. XXI figs. 3-4 (Ghazni River, Helmand basin; Jannichel, Kabul basin; Quetta, Pishin Lora basin).

Further available specimens from Afghanistan (besides those listed by Banarescu & Nalbant, 1966): BMNH 1886.9.21.177-178, from Nushki, 38.8 and 45.0 mm standard length; the largest specimen is here selected as lectotype (fig. 5).

Pakistan specimens are available from: Quetta, Pishin Lora basin; Panjgur on the Rakhshan

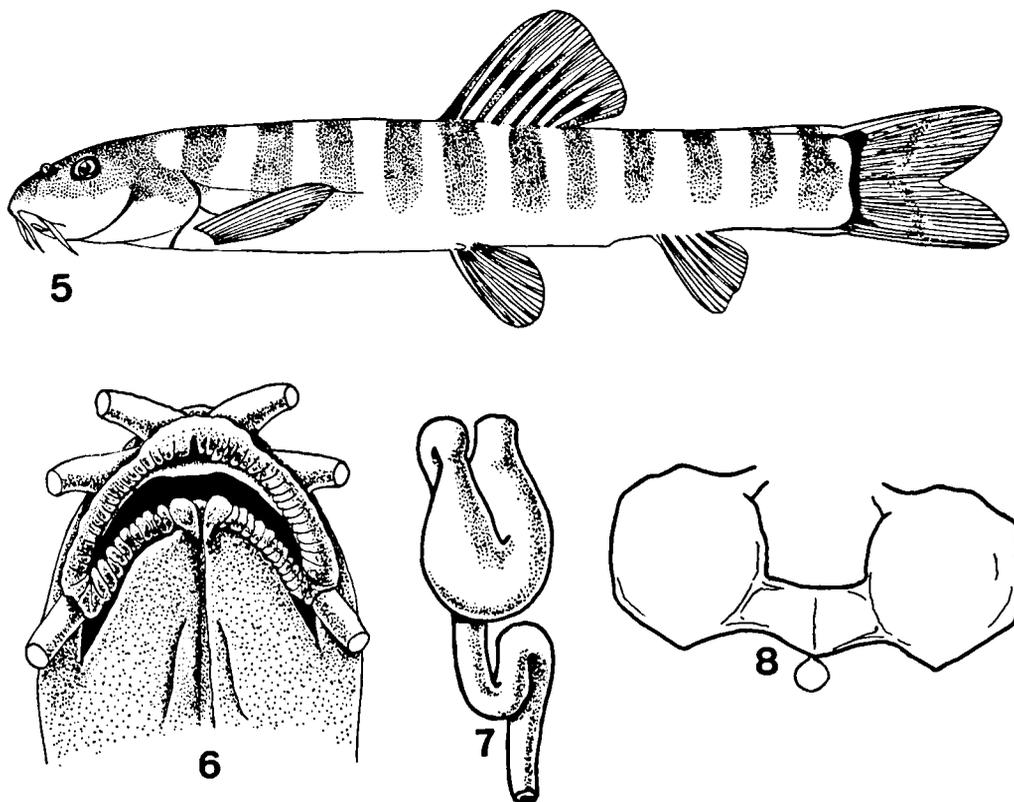


Fig. 5. *Schistura kessleri kessleri*, BMNH 1886.9.21.177, lectotype, from the Nushki River, Pishin Lora basin, Afghanistan. Fig. 6. Do., mouth of lectotype. Fig. 7. Do., digestive tract of paralectotype, BMNH 1886.9.21.178. Fig. 8. Do., air bladder capsule of paralectotype.

River, Hamun-i-Mashkel lake basin; Kalat in Central Brahui mountain range, basin of Bodo River, inner drainage (map 2).

The papers mentioned in the synonymy of the species include a complete description and illustration of *S. kessleri kessleri*, having a low body and caudal peduncle (compared to *S. lindbergi*) and being totally devoid of scales.

Range. — The subspecies probably also occurs, besides the river basins mentioned above, in the basins of the Bolan and Nari rivers. Outside Pakistan, it ranges in the Pishin Lora basin in Afghanistan, and in the Murghab basin in Afghanistan and Turkmenistan (in this basin probably as a distinct subspecies, *S. k. turcomanus* (G. Nikolski, 1947)).

***Schistura kessleri lepidocaulis* Mirza & Nalbant, n. subsp. Figs. 9-13.**

Holotype: ISBB 3366, 43.0 mm standard length (44.0 mm to the end of the scales), Parachinar, basin of the Kurram River, a right tributary of the Indus.

Paratypes: ISBB 3367, ZMA 116.441 (2), and Mirza's private collection, four specimens in all, 32.5-33.0 mm; Sün Sakesar, a closed valley on a left tributary of the Indus, opposite to the Kurram River.

Derivatio nominis. — After *λεπίς* = scale and *caulis* = peduncle, alluding to the occurrence of a few scales on the caudal peduncle.

Diagnosis. — A subspecies of *Schistura kessleri* having isolated scales on a reduced area of the caudal peduncle.

Description. —

D 3/7; A 2/5; P 1/9; V 2/6.

General habitus and body proportions very similar to *S. kessleri kessleri*.

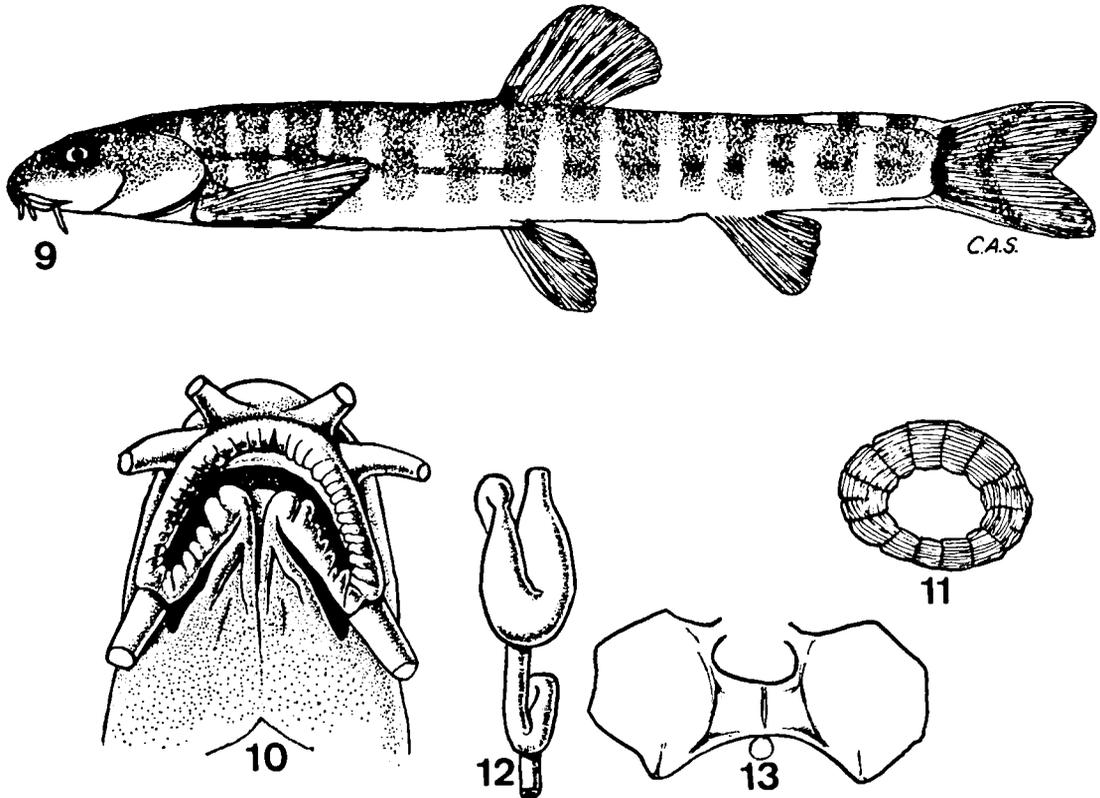


Fig. 9. *Schistura kessleri lepidocaulis* n. subsp., ISBB 3366, holotype, from the Kurram River, Parachinar. Fig. 10. Do., mouth of holotype. Fig. 11. Do., scale from the caudal peduncle of the holotype. Fig. 12. Do., digestive tract of a paratype, ISBB 3367. Fig. 13. Do., air bladder capsule of a paratype, ISBB 3367.

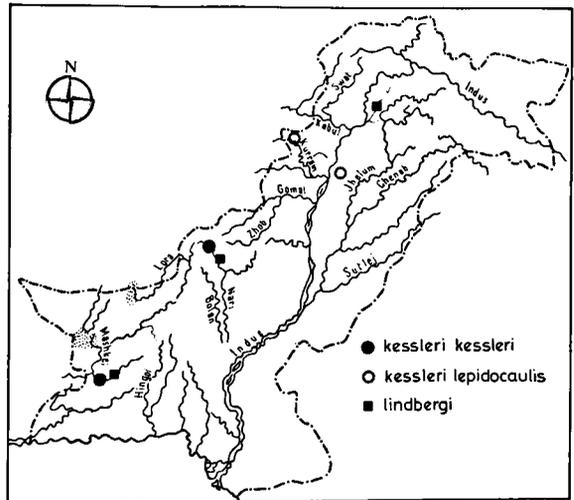
Body depth 12.7-14.5% of standard length (13.5% in the holotype); caudal peduncle length 14.4-18.4% (14.4%); least depth 10.2-12.0% (11.1%); predorsal distance 50.5-55.0% (52.4%); preventral distance 49.0-55.0% (52.4%); preanal distance 72.9-79.0% (76.5%); pectoral-ventral distance 30.8-34.0% (34.8%); ventral-anal distance 24.0-26.2% (25.6%); length of pectoral fin 18.5-24.6% (21.4%); length of ventral fin 18.3-23.1% (18.3%); base of dorsal fin 11.7-13.5% (13.5%); height of dorsal fin 16.9-19.1%; base of anal fin 7.9-9.1% (8.1%); height of anal fin 14.3-16.9% (15.8%); length of head 18.9-23.1% (19.8%); length of snout 6.3-7.7% (6.3%); eye diameter 3.7-4.6% (3.7%). Snout 29.6-33.3% of head (31.8% in holotype); eye diameter 18.6-21.4% of head (18.7%) and 55.0-75.0% of interorbital width (55.0%).

Origin of dorsal fin closer to caudal base than to tip of snout; origin of ventral fins exactly under that of the dorsal one (most specimens) or very slightly behind it.

Lateral line incomplete, ending before dorsal fin or in front of it. Most of the body scaleless; a reduced area, on the sides of the caudal peduncle, covered by isolated scales (fig. 11). Peritoneum dark brown. Lips, intestine, and air bladder capsule as in *S. kessleri kessleri* (figs. 8, 13).

Colour pattern. — Body light yellowish; 14 or 15 broad brownish crossbars extend from the dorsal almost to the ventral side; they are separated by broader light interspaces. A well-marked dark brown spot at the base of dorsal fin insertion; a row of minute spots on the dorsal fin; other fins unspotted.

Range. — This new subspecies was found in two rather distant localities: the basin of the Kurram River, a right tributary of the Indus (south of the Kabul and north of the Gomal rivers) and Sün Sakesar, a valley on the left side of the Indus, just opposite the Kurram River; this valley is drained by several small streams without outlet to the Indus. This range lies rather far north- and eastwards from that of the nominal subspecies (map 2).



Map 2. Distribution of *Schistura kessleri kessleri*, *S. k. lepidocaulis* and *S. lindbergi*.

***Schistura lindbergi* (Banarescu & Mirza, 1965). Fig. 14.**

*Noemacheilus lindbergi* Banarescu & Mirza, 1965: 265, figs. 1-4 (Siaw in the Farah Rud basin, Afghanistan; also Lorai and Panjgur, Pakistan).

The characters of this species and the differences with *S. kessleri* are given in the original description. *S. lindbergi* also resembles *S. prashari*. However, in the latter species the body is scaled (and also the caudal fin more deeply emarginate). We therefore ascribe *S. prashari* to another species group.

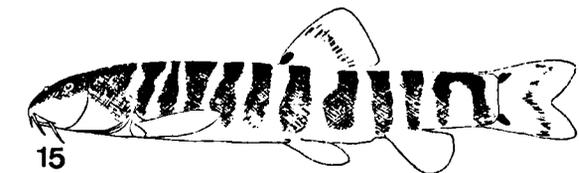
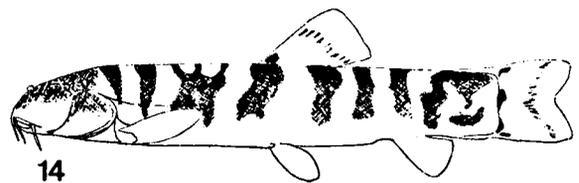


Fig. 14. *Schistura lindbergi*, Hebrew University Jerusalem, Pisces, coll. no. 1572, holotype, from rivulet connected to the Farah Rud drainage, Afghanistan. Fig. 15. *S. naseeri*, ISBB 1235, paratype, from the Madyan River, Swat State.

Range. — *S. lindbergi* was collected from the Loralai River, a tributary of the Beji River, that flows southwards and once was a tributary of the lower Indus, from Panjgur on the Rakhshan River, basin of the lake Hamun-i-Mashkel, and from the Unar River near Ugi, a left tributary of the upper Indus (map 2). The occurrence of this species, that lives mainly in the inner drainages west of the lower Indus, in an eastern tributary of the upper Indus is quite unexpected.

### Group *naseeri-baluchiorum*

The species of this group are characterized by: a small size; rather compressed head (i.e., about as wide as deep); snout pointed in most species, sometimes blunt, always narrowed anteriorly; body scaled, at least in the posterior part; lateral line either short or almost complete; caudal fin forked; processus dentiformis reduced or moderately developed; sexual dimorphism present in most species, absent in a few.

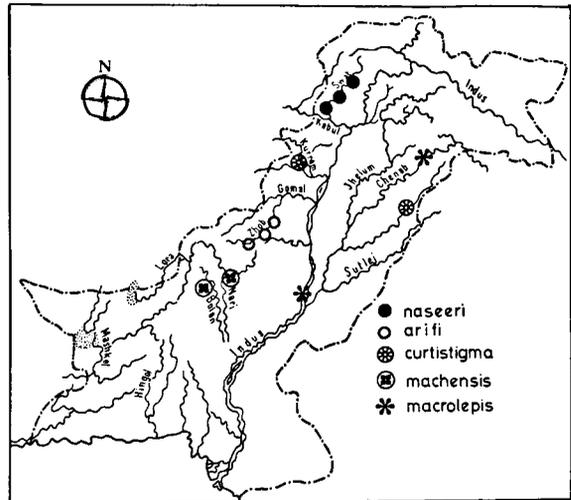
This group seems less natural than the two preceding ones. Its range includes the inner drainages of Pakistan, Afghanistan, Iran, the basins of the Indus, Ganges and Brahmaputra, perhaps also Burma and most of Thailand, but apparently not peninsular India. Most *Schistura* species from Pakistan can be included within this group.

### *Schistura naseeri* (Ahmad & Mirza, 1963). Fig. 15.

*Noemacheilus punjabensis naseeri* Ahmad & Mirza, 1963: 78, fig. 3 (Madyan stream at Madyan, Swat State).

D 3/7; A 2/5; P 1/8-9.

Body depth 11.7-17.2% of standard length; least depth 9.2-10.8%; caudal peduncle length 12.2-15.1%; predorsal distance 48.0-54.0%; pre-ventral distance 48.0-56.0%; pectoral-ventral distance 32.3-38.2%; ventral-anal distance 21.2-27.0%; length of pectoral fins 17.2-21.2%; head 19.4-22.6%; snout 6.0-8.1% (and 31.8-39.0% of head); eye diameter 3.3-4.4% of standard length, 13.0-20.0% of head, and 56.0-72.0% of interorbital width.



Map 3. Distribution of *Schistura naseeri*, *S. arifi*, *S. curtistigma*, *S. machensis* and *S. macrolepis*.

Origin of dorsal fin usually equally distant between tip of snout and base of caudal fin; origin of pelvic fins slightly behind the origin of dorsal fin. Caudal fin forked (shortest rays 59-72% of longest), with rounded lobes; edge of dorsal fin slightly convex. No membranous connection between ventral fins and lower side of body.

Head slightly wider than deep; snout long, pointed, narrowed anteriorly. Eyes directed laterally.

The scales are embedded; they are few, small, distant and occur only in the posterior body half. The lateral line usually reaches to about two-thirds / three-fourths of caudal peduncle, only in a few specimens almost to the caudal fin.

Lips slightly to moderately furrowed; upper one continuous, of uniform width. Processus dentiformis moderate. No sexual dimorphism.

Body light yellowish; 10-12 rather irregular crossbars, usually wider than the interspaces, some of them not sharply delimited. A blackish spot on the origin of the dorsal fin. Bar on caudal fin base in some specimens continuous, in most divided in two fragments. Rays of caudal fin either with a long longitudinal stripe or with two shorter ones.

Range. — Probably endemic to the Swat River basin (map 3); specimens available from Madyan River, Shiner and Mingoara.

Remarks. — We consider this loach specifically distinct from *S. punjabensis* (Hora), a species ranging in the Salt Range, Punjab, east of the Indus.

***Schistura arifi* Mirza & Banarescu, n. sp.**  
Figs. 16-20.

Holotype: ISBB 3775, ♀, 60.7 mm standard length (62.0 mm to the end of the scales), Zhob City (formerly Fort Sandeman) on Zhob River, collected by M. Arif.

Paratypes: ISBB 3376, ZMA 116.442 (1), and Mirza's private collection, four specimens, 35.5-70.5 mm, from the Zhob River.

Derivatio nominis. — Named after M. Arif, collector of the specimens.

Diagnosis. — A *Schistura* species with 8 branched dorsal fin rays; well-marked sexual dimorphism; rather long lateral line, reaching to at least three-fourths of caudal peduncle; completely scaled body; upwards directed eyes; some 8-11 crossbars reaching almost to the ventral side; base of ventral fin connected to the body by a thin membrane.

Description. —

D 3/8; A 2/5; P 1/9-10; V 1/6-7.

Dorsal profile behind nape quite slightly arched. Body depth 12.1-16.6% of standard length (12.2% in holotype); caudal peduncle length 12.4-15.9% (14.6%); least depth 8.9-9.9% (9.8%); predorsal distance 48.5-51.5% (49.5%); preanal distance 54.0-56.5% (54.5%); preanal distance 75.7-79.5% (79.0%); pectoral-ventral distance 32.9-36.2% (32.9%); ventral-anal distance 20.8-24.8% (24.8%); length of pectoral fins 19.8-23.2% (19.8%); length of ventral fins 20.6-22.4% (21.2%); height of dorsal fin 17.8-20.0%; base of dorsal fin 13.7-17.0%; height of anal fin 13.7-17.0%; base of anal fin 7.9-9.4%; head length 21.0-25.4% (21.4%); snout length 8.5-10.3% (8.6%) and 38.8-44.0% of head (40.0%); eye diameter 3.0-4.8% of standard length (3.5%), 14.3-19.0% of head, 66.7-83.0% of interorbital width.

Head more or less triangular, slightly com-

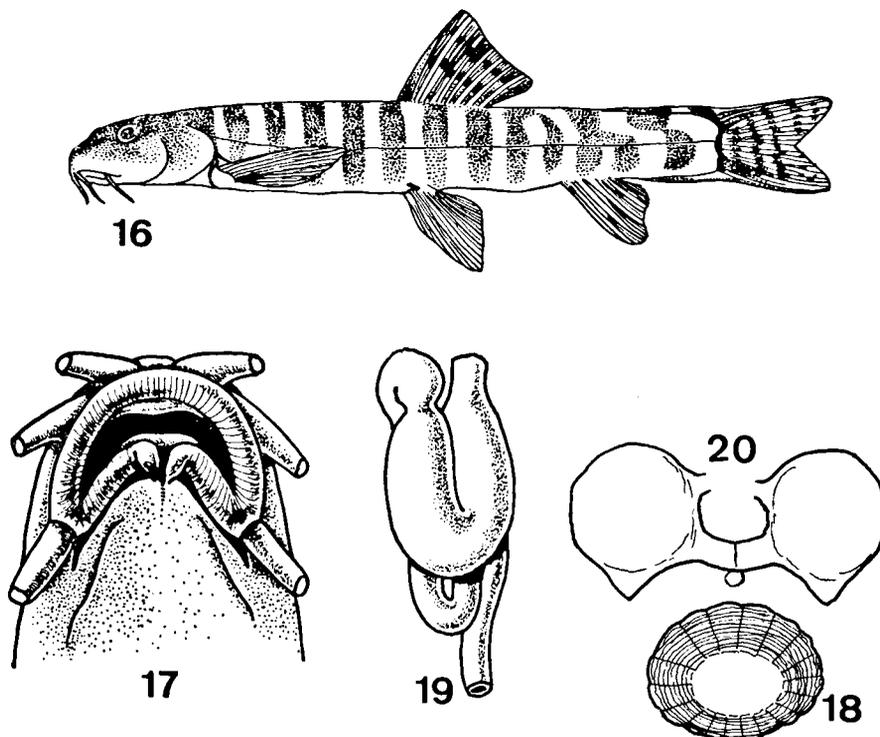


Fig. 16. *Schistura arifi* n. sp., ISBB 3775, holotype, from the Zhob River at Zhob City. Fig. 17. Do., mouth of holotype. Fig. 18. Do., subdorsal scale of holotype. Fig. 19. Do., digestive tract of a paratype, ISBB 3376. Fig. 20. Do., air bladder capsule of a paratype, ISBB 3376.

pressed (deeper than wide); snout pointed, narrowed anteriorly. Nostrils closer to the eye than to the tip of the snout. Eyes directed upwards.

Origin of dorsal fin in some specimens equally distant between tip of snout and base of caudal fin; in others closer either to tip of snout or to caudal fin; origin of ventral fins at some distance behind that of dorsal fin. Edge of dorsal fin emarginate. Caudal fin slightly to moderately forked; its shortest (innermost) ray 68-73% of the longest (outermost); its lobes are pointed. Pectoral fins far from reaching origin of ventral fins; ventral fins almost reaching anal fin insertion. A broad but thin membrane connects the second- or third-last rays of the ventral fins to the lower side of the body.

Scales deeper than long, with a rather large focal zone (fig. 18); they cover most of the body, being absent only on the back in front of the dorsal fin. On the caudal peduncle they are close to each other but not imbricated; in the anterior body half they are distant. The lateral line reaches almost to the caudal fin base or near it.

The lips are moderately furrowed, the upper one continuous (fig. 17). Processus dentiformis moderate.

Loop of the intestine under the stomachic dilatation (fig. 19). The two chambers of the air bladder capsule have a pointed posterior prolongation; the isthmus connecting them is narrow (fig. 20). Peritoneum dark brown.

Sexual dimorphism. — The unique male has a well-developed preocular flap and the second (first branched) pectoral fin ray is thickened; during the spawning season it is probably covered by breeding tubercles. The third (second branched) pectoral fin ray is the longest. In females the third and fourth (second and third branched) pectoral fin rays are equally long.

Colour pattern. — Body light greyish, with 8-11 brownish crossbars reaching from the dorsal almost to the ventral side; they have a regular shape and they are about as wide as the interspaces. A quite evident blackish spot on the origin of the dorsal fin; a continuous dark stripe on the base of the caudal fin; two rows of spots on dorsal, one or two on anal, three to five on caudal fin.

Range. — This species seems to be endemic to the Zhob River basin, tributary to the Gomal River, a right tributary of the middle Indus (map 3); its distribution is the same as that of *S. pakistanica*.

Comparative remarks. — *S. arifi* resembles, in its general habitus and colour pattern, *S. naseeri*; but in *S. arifi* the scales extend over most of the body, there is a sexual dimorphism, the eyes are directed rather upwards and there is a membrane connecting the ventral fin to the lower face of the body. Such a connection also occurs in some other *Schistura* species and above all in the High Asian genus *Triplophysa*.

***Schistura curtistigma* Mirza & Nalbant, n. sp.**  
Figs. 21-25.

Holotype: ISBB 3776, ♂, 44.8 mm standard length (46.0 mm to the end of the scales), Bannu on the Kurram River, a right tributary of the upper Indus, North-West Frontier Province, Pakistan.

Paratypes: ISBB 3377 and ZMA 116.443 (1), two ♀♀, 34.5 (35.0) and 33.5 (34.5) mm, same locality as the holotype.

ISBB 3389, one ♀, Ravi River, Lahore, 28.0 mm.

Derivatio nominis. — After *curtus* = short and *stigma* = spot, the crossbars being shorter than in the related *S. arifi*.

Diagnosis. — A *Schistura* species with 7 or 8 branched dorsal fin rays; sexual dimorphism present; almost complete lateral line; body almost totally scaled; some 11 crossbars not extending below lateral line; eyes smaller than in *S. arifi*; long, pointed and convex snout; ventral fin connected to the lower face of the body by a membrane.

Description. —

D 3/7-8; A 2/5; P 1/9-10; V 1/7.

Dorsal profile ascending from tip of snout to above nostrils, then almost horizontal. Body depth 14.5-15.6% of standard length (15.6% in the holotype); least depth 10.9-11.6% (10.9%); caudal peduncle length 13.4-14.5% (13.6%); predorsal distance 51.0-54.0% (51.0%); pre-ventral distance 54.5-56.5% (54.5%); preanal distance 77.5-80.5% (77.5%); pectoral-ventral distance 33.2-37.0% (33.2%); ventral-anal distance 22.1-23.1% (23.0%); length of pec-

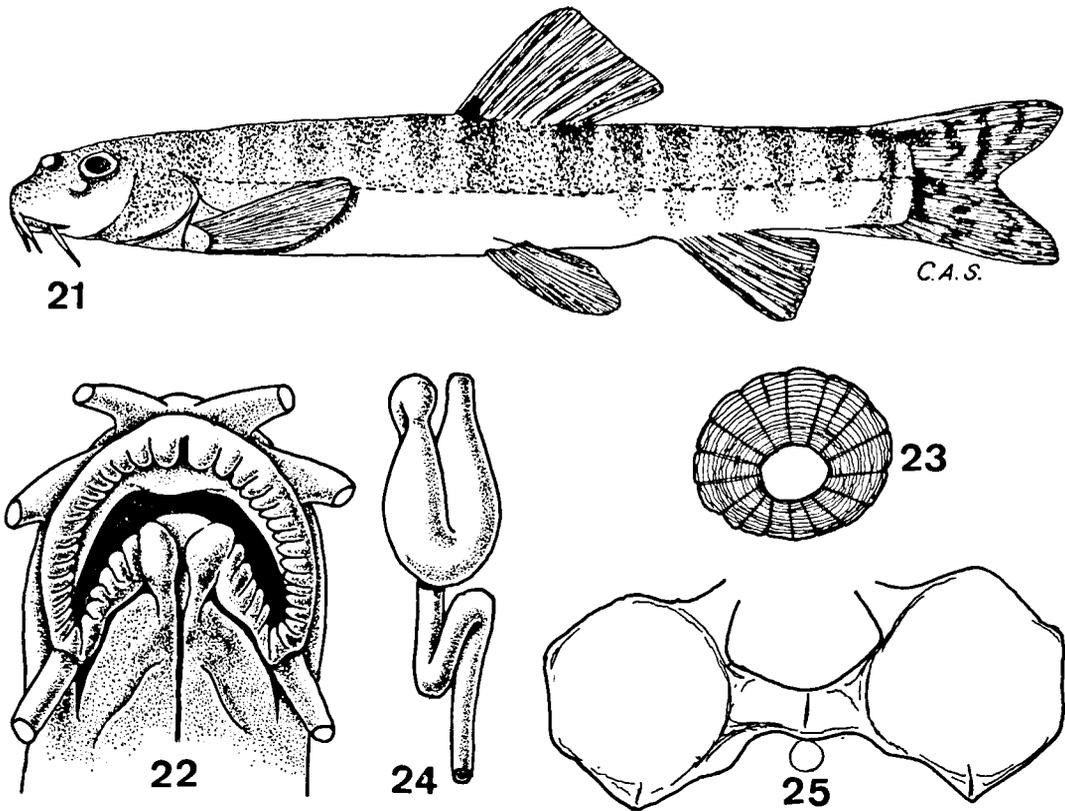


Fig. 21. *Schistura curtistigma* n. sp., ISBB 3776, holotype, from the Kurram River, Bannu. Fig. 22. Do., mouth of holotype. Fig. 23. Do., subdorsal scale of holotype. Fig. 24. Do., digestive tract of a paratype, ISBB 3377. Fig. 25. Do., air bladder capsule of a paratype, ISBB 3377.

toral fins 20.8-25.0% (25.0%); length of ventral fins 17.8-20.8% (20.0%); height of dorsal fin 17.9-20.5% (20.5%); base of dorsal fin 14.0-15.2% (15.2%); height of anal fin 14.8-17.4% (16.1%); base of anal fin 7.5-9.4% (9.4%); length of head 23.4-27.4% (23.4%); length of snout 9.7-11.5% of standard length (9.7%) and 41.0-42.0% of head (41.0%); eye diameter 3.2-3.6% of standard length (3.6%), 11.6-15.2% of head (15.2%) and 52.5-59.5% of interorbital width (59.5%).

Head slightly wider than deep. Eyes smaller than in other species of the genus, directed upwards. Snout long (especially in the two ♀♀), pointed and convex. Nostrils much closer to the eyes than to the tip of the snout.

Origin of dorsal fin closer to tip of snout than base of caudal fin or equally distant between both; origin of ventral fins behind that of dor-

sal fin. Edge of dorsal fin straight. Caudal fin forked, its shortest ray 65.5-74.5% of the longest; its lobes slightly rounded. Pectoral fins far from reaching the origin of ventral fin; ventral fins reaching or almost reaching to anus, that is a short distance in front of anal fin insertion. A narrow membrane connects the upper side of the ventral fin (second or third inner ray) to the lower face of the body.

Scales deeper than long, with reduced focal zone (fig. 23). They are close to each other on the caudal peduncle (but not imbricated), become more distant anteriorly. They cover most of the body, except the back in front of the dorsal fin. The lateral line reaches almost to the base of the caudal fin.

Lips moderately furrowed, the upper one with a slight median incision (fig. 22). Processus denticiformis reduced.

Loop of the intestine below the stomachic dilatation (fig. 24). Air bladder capsule similar to that of *S. arifi* (fig. 25). Peritoneum blackish.

Sexual dimorphism. — As in *S. arifi*.

Colour pattern. — Badly preserved in the specimens available. One can distinguish, with difficulty, about 11 crossbars reaching from the back to the lateral line but not below it. Four rows of minute spots on the caudal fin. A vague dark spot on the origin of the dorsal fin, as in most species of the genus; it is probably better marked in live or well-preserved specimens.

Range. — The species is known from two distant localities in the Indus basin: Bannu on the Kurram River, a right tributary of the upper Indus, and Lahore on the Ravi River, an indirect tributary of the Sutlej River (map 3).

Comparative remarks. — *S. curtistigma* is close to *S. arifi*; its distinctive features are: shorter crossbars, smaller eyes, longer and convex snout.

***Schistura machensis*** (Mirza & Nalbant, 1970). Fig. 26.

*Noemacheilus horai machensis* Mirza & Nalbant, in Mirza, Banareescu & Nalbant, 1970: 54, figs. 7-9 (Mach River, tributary to the Bolan River; also Harnai, Kaman Beji basin).

This species has 7 or 8 branched dorsal fin rays, an incomplete lateral line, ending above ventral fins or anal fin; scales with a rather large focal zone and extending on the anterior part of the body; short and pointed snout; reduced processus dentiformis; sexual dimorphism present; loop of the intestine longer than in other *Schistura* species,

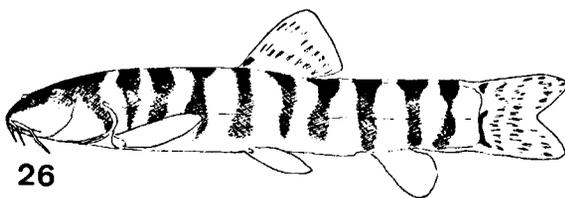


Fig. 26. *Schistura machensis*, ISBB 1538, holotype, from the Mach River, tributary of the Bolan River, Indus drainage.

partially under the stomachic dilatation; the two halves of the air bladder capsule rounded posteriorly and pointed anteriorly; 8-10 wide brownish crossbars, extending below lateral line; brownish bar on base of caudal fin interrupted; moderately forked caudal fin with roundish lobes.

Range. — Basins of Bolan and Kaman-Beji (tributaries of Nari) rivers, both ending in lake Bolan Nari, inner drainage (map 3).

We now consider this loach as specifically distinct from *S. horai* (Menon) that ranges in the Kangra Valley, Punjab, eastern part of the Indus basin.

***Schistura macrolepis*** Mirza & Banareescu, n. sp. Figs. 27-31.

Holotype: ISBB 3778, ♀, 29.5 mm standard length (30.0 mm to the last scales), collected by M. Sadiq at Racki Munh, Dera Ghazi Khan district, a small right tributary of the Indus upwards from the confluence of the Sutlej River.

Paratypes: ZMA 116.444 (1), and Mirza's private collection, same data as the holotype, one ♂, 29.0 mm and one ♀, 27.8 mm; ISBB 3867, one ♂, 36.0 mm, Shadiwal, upper reach of the Chenab River, a tributary of the Sutlej River.

Derivatio nominis. — After  $\mu\alpha\kappa\rho\acute{o}\varsigma$  = large and  $\lambda\epsilon\pi\tau\acute{\iota}\varsigma$  = scale.

Diagnosis. — A *Schistura* species with eight branched dorsal fin rays; large scales covering the whole body; almost complete lateral line; sexual dimorphism present; some 8 or 9 irregular crossbars, reaching below lateral line but not to the ventral side; forked caudal fin; the stripe on caudal fin base interrupted; a slight adipose keel on caudal peduncle; long and pointed snout.

Description. —

D 3/8; A 2/5; P 1/8; V 1/6.

Upper profile slightly arched. Body depth 13.9-16.0% of standard length (16.0% in the holotype); least depth 12.3-12.9% (12.5%); caudal peduncle length 12.4-13.8% (12.6%); predorsal distance 50.0-55.0% (53.5%); pre-ventral distance 52.8-55.8% (55.8%); preanal distance 78.0-81.0% (81.0%); pectoral-ventral distance 30.6-34.2% (30.6%); ventral-anal distance 23.8-25.6% (23.8%); length of pectoral fins 23.4-27.1% (27.1%); length of ventral fins

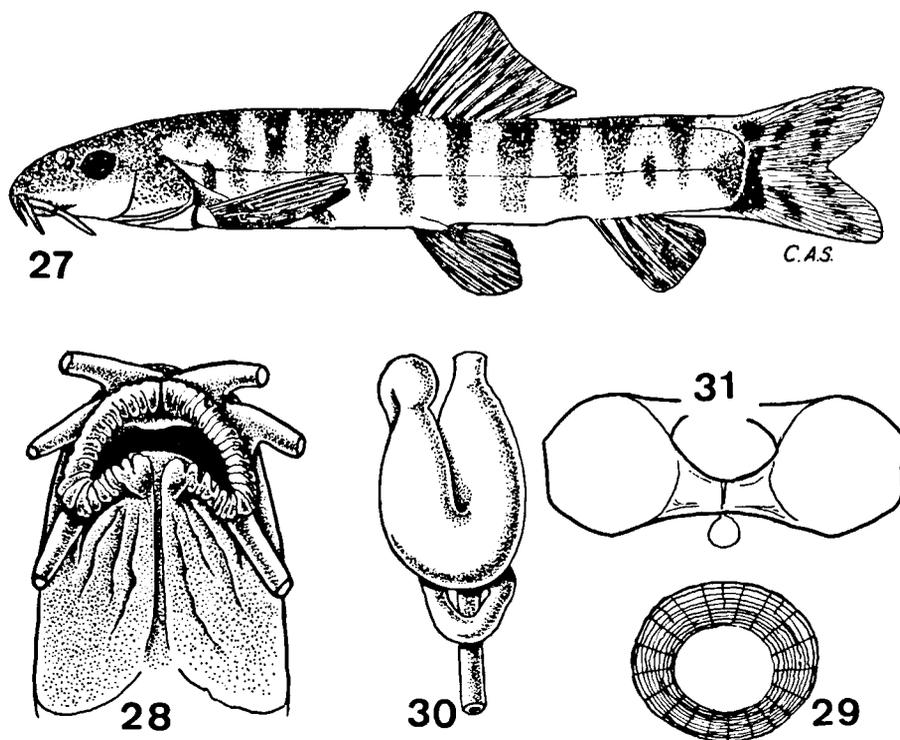


Fig. 27. *Schistura macrolepis* n. sp., ISBB 3778, holotype, from Racki Munh, Dera Ghazi Khan district, Indus drainage. Fig. 28. Do., mouth of holotype. Fig. 29. Do., subdorsal scale of holotype. Fig. 30. Do., digestive tract of paratype from the type-locality, Mirza's private collection. Fig. 31. Do., air bladder capsule of paratype from the type locality, Mirza's private collection.

21.4-23.6% (23.4%); height of dorsal fin 20.7-23.0% (23.0%); base of dorsal fin 14.4-16.9% (16.9%); height of anal fin 15.8-16.7% (16.3%); base of anal fin 8.3-10.3% (9.5%); head length 24.4-25.2% (25.1%); snout length 8.4-10.1% (9.5%) and 37.4-41.2% of head (37.8%); eye diameter 4.0-4.5% of standard length (4.4%), 16.2-18.2% of head (17.5%) and 68.5-73.0% of interorbital width (68.5%).

Head slightly wider than deep. Snout long, pointed, narrowed anteriorly. Eyes small, directed rather laterally.

Origin of dorsal fin slightly closer to base of caudal fin than to tip of snout or equally distant between both; origin of ventral fins slightly behind that of dorsal fin. Edge of dorsal fin emarginate. Caudal fin forked, its shortest ray 68.5-73.5% of the longest; lobes of caudal fin rounded. Pectoral fins not reaching ventral origin, ventral fins reaching or almost reaching the origin of the anal fin. Anus slightly in front of anal fin. A

dorsal adipose crest on the caudal peduncle.

Scales large, with wide focal zone (fig. 29); they cover the whole body, being imbricated in the posterior body part. Lateral line reaching almost to base of caudal fin.

Lips furrowed, upper one with a median incision (fig. 28); processus dentiformis moderately developed; no incision on the lower jaw. Loop of the intestine partially covered by the stomachic dilatation (fig. 30). The two halves of the air bladder capsule roundish, wider than long, without prolongation (fig. 31). Peritoneum blackish.

Sexual dimorphism. — The two males have a mobile preocular flap; the second to fourth (first to third branched) pectoral fin rays are thickened; breeding tubercles surely develop during the spawning season; the upper face of the head (not the sides) covered by minute whitish breeding tubercles.

Colour pattern. — Body light yellowish, with eight to nine brownish crossbars, of irregular shape and unequal size; a few independent spots in the interspaces between the crossbars. A blackish spot on the origin of the dorsal fin. The dark bar on the base of the caudal fin is interrupted, its upper fragment being an independent spot. Two rows of vague spots on caudal fin.

Range. — *S. macrolepis* was found in two localities lying on both sides of the middle Indus: Racki Munh on a small right tributary of the Indus, opposite to the confluence of the Sutlej River and Shadiwal, upstream on the Chenab River, the main tributary of the Sutlej River. The species probably lives throughout most of the Sutlej basin (map 3).

Comparative remarks. — *S. macrolepis* seems closest to *S. machensis* from the inner drainages of Pakistan, west of the Indus, about at the level of the lower Sutlej River. *S. machensis* differs from *macrolepis* in having seven branched dorsal fin rays, shorter snout, smaller eyes, incomplete lateral line (reaching only to the level of the ventral fins or anal fin), and no breeding tubercles on the top of the head. It must be pointed out that, according to our present knowledge, *macrolepis* is the only *Schistura* species having breeding tubercles on the upper face of the head.

### *Schistura baluchiorum* (Zugmayer, 1912).

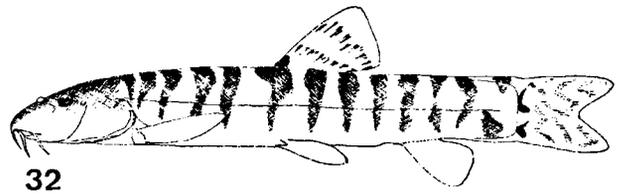
Fig. 32.

*Nemacheilus baluchiorum* Zugmayer, 1912: 599 (Panjgur, Baluchistan); Zugmayer, 1913: 31 (Panjgur); Hora, 1933a: 185, pl. V figs. 6, 7 (Panjgur).

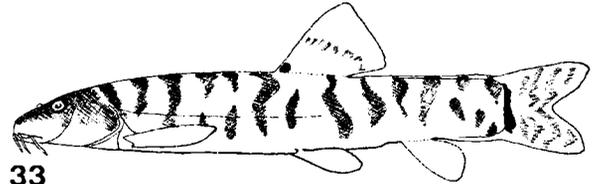
*Noemacheilus baluchiorum*; Mirza, Banarescu & Nalbant, 1970: 48, figs. 1-3 (Panjgur).

Not *Noemacheilus baluchiorum*, Banarescu & Nalbant, 1966: 177, figs. 15, 17 (Kajkai, Helmand River basin, southern Afghanistan).

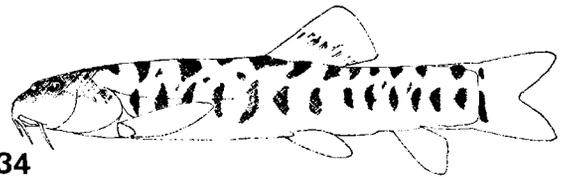
This species is characterized by 7 branched dorsal fin rays; subcylindrical body; long snout; roundish scales with a wide focal zone; lateral line reaching in most specimens to above the anal fin (in a few ones only to above the ventral fins); 11-14 brownish crossbars that extend far below the lateral line, becoming narrower downwards and being



32



33



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Fig. 32. *Schistura baluchiorum*, ISBB 1537, from Panjgur, Rakhshan River. Fig. 33. *S. anambarensis*, ISBB 1364, holotype, from the Anambar River at Loralai. Fig. 34. *S. barnaiensis*, ISBB 2006, from Harnai, Kaman-Beji River basin.

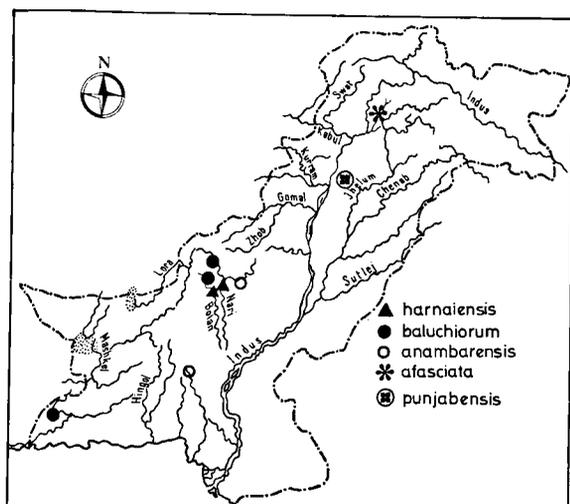
about as broad as or somewhat narrower than the light interspaces. There is sexual dimorphism. The upper lip is continuous, somewhat broader medially; the processus dentiformis is reduced. The loop of the intestine is wide and touches the stomachic dilatation. The two halves of the air bladder capsule have a pointed posterior prolongation and the manubrium connecting them is wide.

Range. — The species was up to now recorded only from Panjgur on the Rakhshan River, lake Hamun-i-Mashkel basin, inner drainage of Baluchistan. We have also a specimen from Harnai, Kaman-Beji basin, inner drainage (map 4). This specimen does not seem to differ from the many available ones from Panjgur.

### *Schistura anambarensis* (Mirza & Banarescu, 1970). Fig. 33.

*Noemacheilus anambarensis* Mirza & Banarescu, in Mirza, Banarescu & Nalbant, 1970: 51, figs. 2-6 (Anambar River near Loralai).

This species has 7 branched dorsal fin rays; subcylindrical body; long and pointed snout; incom-



Map 4. Distribution of *Schistura harnaiensis*, *S. baluchiorum*, *S. anambarensis*, *S. afasciata* and *S. punjabensis*.

plete lateral line (ending under or in front of dorsal fin); rather circular scales with moderately large focal zone, imbricated posteriorly; reduced processus dentiformis; sexual dimorphism present; long loop of the intestine, touching the stomachic dilatation; the two halves of the air bladder capsule with both an anterior and a posterior pointed prolongation; forked caudal fin; narrow, rather irregular crossbars, some of them incomplete.

Range. — *S. anambarensis* is known from two localities, both in the inner drainage west of the Indus: the Anambar River near Loralai (type-locality) in the basin of the Nari River, that flows in the lake Nari-Bolan, and the Sasol River at Khuzdar, Kolachi River basin (map 4). This is the first record of the species from a second locality.

Remarks. — *S. anambarensis* is very close to *S. baluchiorum*, differing from it in its shorter lateral line (but in one *baluchiorum* from Panjgur the lateral line is as short as in *anambarensis*) and the shape of the air bladder capsule. Since *baluchiorum* occurs, besides in the lake Hamun-i-Mashkel basin, also in the basin of the Kaman Beji River, thus in a river basin close to the range of *anambarensis*, we consider both loaches a distinct species, not as subspecies of one another.

***Schistura harnaiensis*** (Mirza & Nalbant, 1969).  
Fig. 34.

*Noemacheilus harnaiensis* Mirza & Nalbant, in Mirza, Banarescu & Nalbant, 1969: 89, pl. II figs. 4-6 (Harnai, Kaman-Beji basin).

This species has 7 branched dorsal fin rays; incomplete lateral line, ending behind the vertical from the tip of the pectoral fins or under the base of the dorsal fin; minute scales, present over most of the body, with a reduced focal zone; moderately developed processus dentiformis and no incision on the lower jaw; loop of the intestine below stomachic dilatation; the two halves of the air bladder capsule wider than long and rounded; sexual dimorphism present; forked caudal fin; reduced and short adipose crest on caudal peduncle; no true crossbars, but distinct dorsal and lateral spots that do not exactly correspond.

Range. — The species is up to now known only from Harnai, in the basin of the Kaman Beji River, that continues as the Nari River, ending in the lake Nari-Bolan, inner drainage of Pakistan, west of the Indus (map 4).

***Schistura afasciata*** Mirza & Banarescu, n. sp.  
Figs. 35-39.

Holotype: ISBB 3368, ♂, 37.2 mm standard length (37.9 mm to last scale), Havelian on the Dor River, left tributary of the upper Indus in northern Pakistan.

Derivatio nominis. — After *a* = without, and *fascia* = bar, because of the absence of crossbars.

Diagnosis. — A *Schistura* species with 8 branched dorsal fin rays; almost completely scaled body; lateral line reaching almost to the base of the caudal fin; sexual dimorphism present; forked caudal fin; no crossbars, but back uniformly brownish-grey.

Description. —

D 3/8; A 2/5; P 1/9; V 1/8.

Body of rather uniform depth. Body depth 15.6% of standard length; least depth 11.4%; caudal peduncle length 11.9%; predorsal distance 54.0%; preventral distance 56.4%; preanal

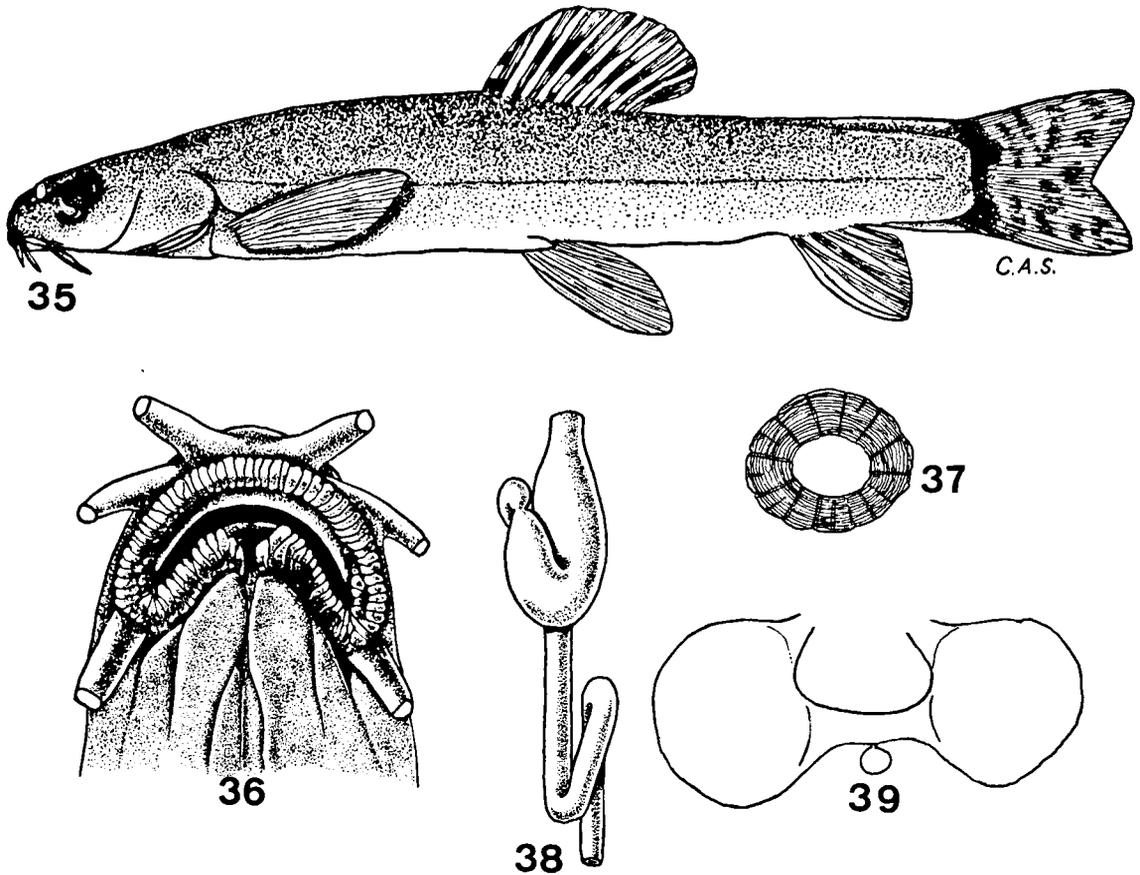


Fig. 35. *Schistura afasciata* n. sp., ISBB 3368, holotype, from Havelian, Dor River, Indus basin. Fig. 36. Do., mouth of holotype. Fig. 37. Do., subdorsal scale of holotype. Fig. 38. Do., digestive tract of holotype. Fig. 39. Do., air bladder capsule of holotype.

distance 80.5%; pectoral-ventral distance 33.5%; ventral-anal distance 25.6%; length of pectoral fins 23.8%; length of ventral fins 21.7%; height of dorsal fin 20.6%; base of dorsal fin 18.5%; head length 23.8%; snout length 8.4% (and 35.8% of head); eye diameter 4.85% of standard length, 20.0% of head, 72.0% of interorbital width.

Head slightly wider than deep. Snout long, pointed; eyes directed laterally.

Origin of dorsal fin closer to the base of the anal fin than to the tip of the snout; origin of ventral fins behind that of dorsal fin. Edge of dorsal fin slightly convex. Pectoral fins not reaching ventral fin insertion, ventral fins not reaching anus; anus slightly in advance of origin of anal fin.

Scales (fig. 37) slightly imbricated posteriorly,

distant in the middle of the body, absent in the anterior third. Lateral line long, reaching almost to caudal fin base.

The lips are rather strongly furrowed for a *Schistura* (fig. 36), the upper one is continuous, without median incision. Processus dentiformis vaguely indicated. Intestine rather long, its loop far below the stomachic dilatation (fig. 38). The two chambers of the air bladder capsule are rounded; the manubrium is narrow (fig. 39). Peritoneum dark brown.

Sexual dimorphism. — The only specimen on which this species is based is a male; it has a pre-ocular flap, the second (first branched) pectoral ray is widened, thickened and covered by breeding tubercles arranged on plates; the third and fourth

rays are covered by breeding tubercles too, but they are not widened.

Colour pattern. — Back uniformly light greyish-brown; no crossbars or longitudinal stripe, but a vertical bar on base of caudal fin; a slight brownish spot on origin of dorsal fin; a row of spots near the middle of each dorsal fin ray; vague spots on caudal fin; other fins unspotted.

Range. — Known only from the type-locality on the Dor River (map 4).

Remarks. — This species seems close to *S. barnaiensis*; both have the same habitus, same shape of the lips, etc; but *barnaiensis* has only seven branched dorsal fin rays, a shorter lateral line, and crossbars. It must be pointed out that *barnaiensis* is the only *Schistura* in the area that has interrupted crossbars, this fact indicating a trend towards their reduction; since in *afasciata* the crossbars have completely vanished, this species can be considered apomorphic. But, in respect of the length of the lateral line, *afasciata*, with its complete lateral line, is plesiomorphic, *barnaiensis* apomorphic.

#### *Schistura prashari* (Hora, 1933). Fig. 40.

*Nemachilus prashari* Hora, 1933b: 189 (275 m north of Kohat City, on the Kohat Toi River, a small right tributary of the Indus).

We identified as *S. prashari* specimens from the Swat River basin, from Rawalpindi and Hasana-bdal on the Haro River, from the Sün Sakesar Valley and from Ali Masjid (Khyber Pass, on the Kabul River).

These specimens are characterized by:

D 3/7; body depth 14.5-17.8% of standard length (19.6% in the single specimen from the Sün Sakesar Valley); least depth 10.2-12.8%; caudal peduncle length 12.2-17.3%; predorsal distance 51.0-59.0%; preventral distance 53.0-57.0%; pectoral-ventral distance 30.5-39.0%; ventral-anal distance 23.5-28.5%; head length 22.9-27.0%; snout length 6.8-9.6%. Caudal fin forked.

Body scaled; lateral line incomplete, reaching under or slightly behind the dorsal fin. Upper lip

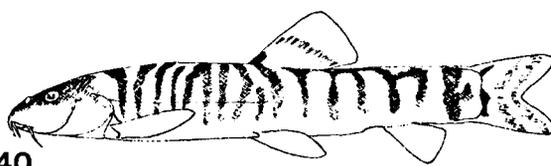


Fig. 40. *Schistura prashari*, after Hora (1933b), modified.

continuous, moderately furrowed. Loop of the intestine touching the stomachic dilatation. The two chambers of the air bladder capsule with a short posterior prolongation.

Some 12-15 narrow, irregular and unsharply delimited crossbars. A well-marked black spot on the origin of the dorsal fin. Bar on caudal fin base in most specimens continuous, in those from Ali Masjid divided in two spots.

No sexual dimorphism.

Remarks. — The available specimens are similar to *N. prashari* as described and illustrated by Hora, except that they are scaled; Hora mentions the species being scaleless, but he may have overlooked the scales.

Range. — The type-locality lies on the Kohat Toi River, a right tributary of the Indus, south of the Kabul River; we identified as *S. prashari* specimens from some right tributaries of the Indus (Swat River and Ali Masjid on the Kabul River) and from the Haro River, a left tributary. All these localities, although on both sides of the Indus, are geographically close (map 5).

#### *Schistura fascimaculata* Mirza & Nalbant, n. sp. Figs. 41-45.

Holotype: ISBB 3371, ♀, 25.0 mm standard length (26.0 mm to the last scales), Hangu, Kohat district on the Kohat Toi River.

Paratypes: ISBB 3372, ZMA 116.445 (2), and Mirza's private collection, five specimens (1 ♂ and 4 ♀♀), 21.5-26.0 mm, same locality as the holotype.

Derivatio nominis. — After *fascia* = bar and *macula* = spot.

Diagnosis. — A small sized *Schistura* species with 7 branched dorsal rays; few scales present only on

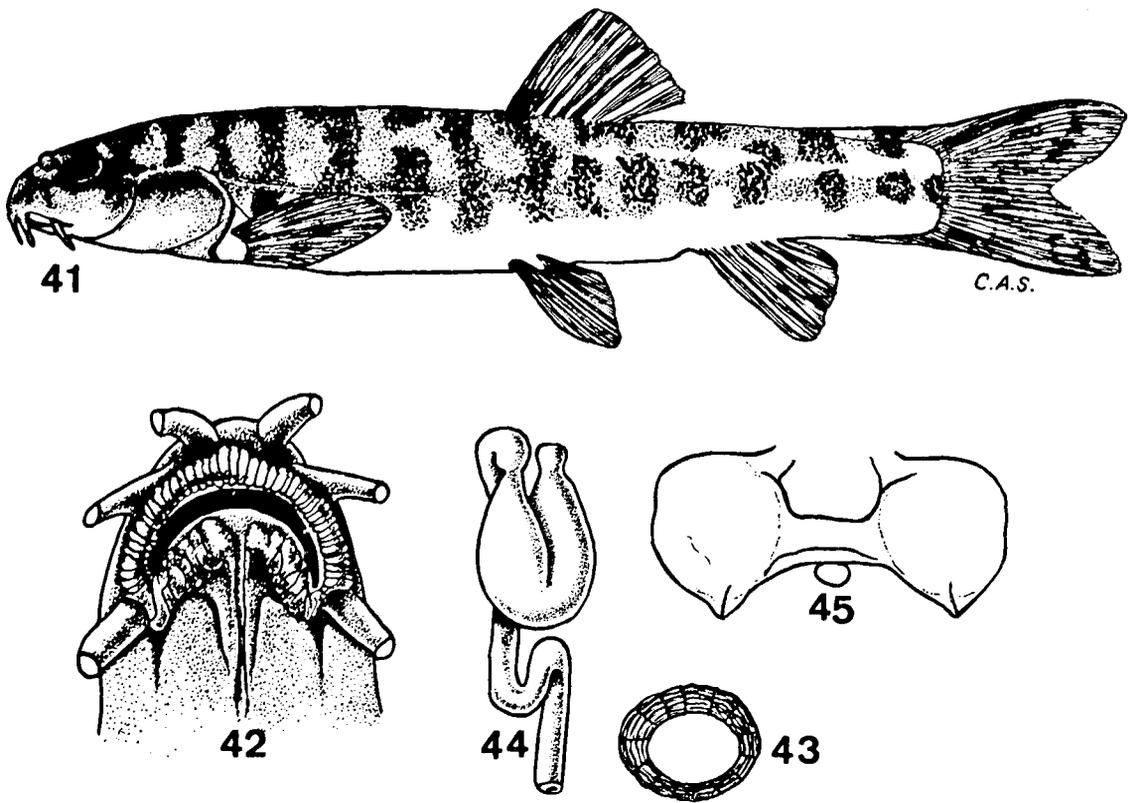


Fig. 41. *Schistura fascimaculata* n. sp., ISBB 3371, holotype, from Hangu on the Kohat Toi River. Fig. 42. Do., mouth of holotype. Fig. 43. Do., scale from the caudal peduncle of holotype. Fig. 44. Do., digestive tract of a paratype, ISBB 3372. Fig. 45. Do., air bladder capsule of a paratype, ISBB 3372.

caudal peduncle; short lateral line, reaching only above the tip of the pectoral fins; forked caudal fin; body lower than in the sympatric *S. prashari*; sexual dimorphism present; 11-15 crossbars, most of which are interrupted, consisting of a dorsal and a median part, the lateral chambers of the air bladder capsule with a pointed posterior prolongation.

**Description.** —

D 3/7; A 2/5; P 1/9; V 1/6.

Dorsal profile convex from tip of snout to nape, almost horizontal behind head. Body depth 13.4-16.0% of standard length (16.0% in the holotype); least depth 8.6-10.8% (9.2%); caudal peduncle length 11.6-13.5% (13.7-15.0% if measured to the last scale); predorsal distance 51.0-53.0% (52.0%); preventral distance 52.8-56.5% (52.8%); preanal distance 76.0-79.5%; pectoral-ventral distance 31.5-33.0% (32.0%);

ventral-anal distance 21.8-24.4% (24.0%); length of pectoral fins 24.0-25.2%; length of ventral fins 19.6-21.3%; depth of dorsal fin 20.4-22.2%; base of dorsal fin 13.3-15.5%; height of anal fin 16.0-19.7%; base of anal fin 8.9-12.3%; length of head 24.0-27.9% (24.0% in the holotype); length of snout 8.4-10.2% (8.4%) and 31.7-37.0% of head (35.0%); eye diameter 4.8-5.3% of standard length (4.8%), 16.9-20.0% of head (20.0%) and 59.0-78.0% of interorbital width (60.0%).

Head slightly wider than deep; snout moderately blunt, narrowed anteriorly. Nostrils more distant from one another than in other species.

Origin of dorsal fin in most specimens equally distant between tip of snout and caudal fin base, in one specimen closer to caudal fin base; origin of ventral fins slightly behind that of dorsal fin. Edge of dorsal fin slightly convex. Tip of pectoral fins not reaching origin of ventral fins; tip

of ventral fins usually reaching anal fin insertion, sometimes beyond it. Caudal fin forked (shortest rays 70.5-82.5% of longest), with rounded lobes.

Scales roundish, with wide focal zone (fig. 43); they are few, isolated, present on the caudal peduncle only. Lateral line short, reaching only above tip of pectorals.

Lips furrowed, anterior one not interrupted (fig. 42). Loop of the intestine not in contact with the stomachic dilatation (fig. 44). The chambers of the air bladder capsule pointed posteriorly (fig. 45). Peritoneum blackish.

Sexual dimorphism. — The only male, probably not fully mature, has a preocular flap, less developed than in other species; the second and third pectoral rays are thickened.

Colour pattern. — Body light greyish, with 11-15 brownish crossbars that, unlike most other *Schistura* species, are not continuous, but restricted to the middle of the side; on the back there are fewer dorsal spots, not corresponding to the lateral crossbars. Numerous blackish dots occur both on the crossbars and on the interspaces, not extending to the ventral face. A dark spot on the origin of the dorsal fin in some specimens, including the holotype, and an oblique stripe on the base of the two longest rays of the caudal fin; one or two rows of hardly visible spots on the caudal fin.

Range. — Known only from the type-locality on the Kohat Toi River, a small right tributary of the Indus, south of Kabul and north of the Kurum River (map 5).

Remarks. — This new species shows similarities with *S. sargadensis* from central Iran and with the sympatric *S. prashari* and *S. kohatensis*. The available material of *S. sargadensis* from the Kul River, southwestern Iran, collected by Dr. P.-G. Bianco, resembles *S. fascimaculata* in general habitus and colour pattern, but has eight branched dorsal fin rays, a less forked caudal fin, and different body proportions. *S. prashari* from the Swat and Haro rivers has a deeper body and caudal peduncle, shorter lateral line, more numerous scales and

no sexual dimorphism. The distinctive characters of *S. kohatensis* are mentioned below.

***Schistura kohatensis* Mirza & Banareescu, n. sp.**  
Figs. 46-50.

Holotype: ISBB 3373, ♂, 30.0 mm standard length (30.8 mm to the last scale), Hangu, Kohat District, on the Kohat Toi River, a small right tributary of the Indus.

Paratypes: ISBB 3374, ZMA 116.446 (2), and Mirza's private collection, four specimens (2 ♂♂, 2 ♀♀), 26.8-29.0 mm standard length (27.5-30.0 mm to the last scale).

Derivatio nominis. — From the Kohat District, type-locality.

Diagnosis. — A small species of *Schistura* with eight branched dorsal fin rays; 10 to 12 more or less regular crossbars extending below lateral line; forked caudal fin; sexual dimorphism present; body almost completely scaled; incomplete lateral line ending below dorsal fin; a quite short adipose crest on the caudal peduncle; dark bar on base of caudal fin interrupted.

Description. —

D 3/8; A 2/5; P 1/8-9; V 1/6.

Body depth 13.1-16.7% of standard length (16.7% in the holotype); least depth 9.7-11.7% (11.7%); caudal peduncle length 11.2-14.8% (12.0%); predorsal distance 51.0-53.5% (51.5%); preventral distance 53.5-56.9% (53.5%); preanal distance 75.0-82.0%; pectoral-ventral distance 29.7-33.6% (29.7%); ventral-anal distance 23.2-26.0% (25.0%); length of pectoral fins 22.4-26.7% (26.7%); length of ventral fins 18.7-22.2% (21.7%); height of dorsal fin 21.6-27.2% (21.7%); base of dorsal fin 14.9-17.9% (15.8%); height of anal fin 16.7-18.3% (18.3%); head length 24.2-26.5% (26.4%); snout length 8.3-10.0% (9.3%) and 34.3-38.4% of head (35.4%); eye diameter 4.5-5.0% of standard length (5.0% in the holotype), 18.3-20.0% of head (19.0%) and 66.7-73.0% of interorbital width (71.5%).

Head slightly wider than deep. Snout long, blunt; eyes directed rather laterally.

Origin of dorsal fin about equally distant between tip of snout and base of caudal fin; origin of ventral fins slightly behind that of dorsal fin. Edge of dorsal fin slightly convex or straight.

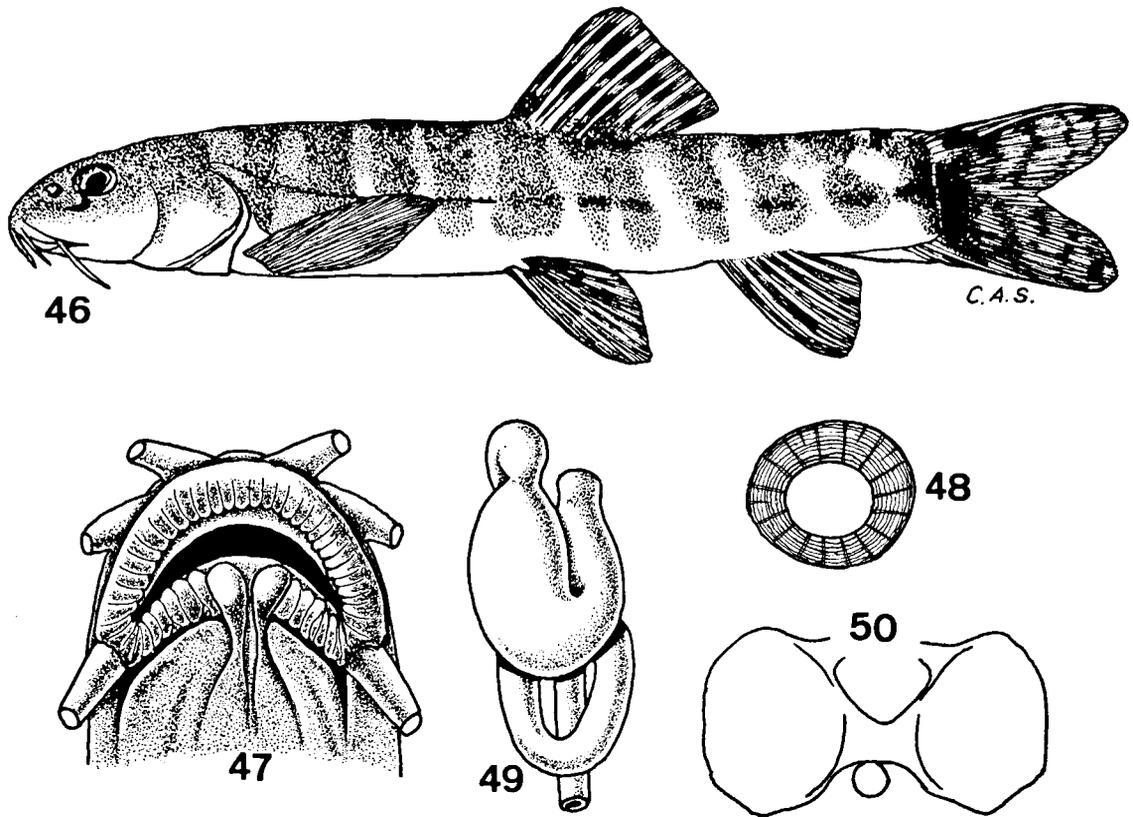


Fig. 46. *Schistura kohatensis* n. sp., ISBB 3375, holotype, from Hangu, on the Kohat Toi River. Fig. 47. Do., mouth of holotype. Fig. 48. Do., subdorsal scale of holotype. Fig. 49. Do., digestive tract of a paratype, ISBB 3374. Fig. 50. Do., air bladder capsule of a paratype, ISBB 3374.

Caudal fin forked, its shortest ray 69.5-83.0% of the longest, its lobes rounded. Pectoral fins not reaching the origin of the ventral fin, ventral fins not reaching anal fin. Anus immediately in front of origin of anal fin. Slight indication of adipose crest on caudal peduncle.

Scales almost circular, with reduced focal zone (fig. 48). On the caudal peduncle they are imbricated; anteriorly they extend along the lateral line to the margin of the opercle, but they are lacking on the back in front of the dorsal fin and on the belly in front of the ventral fins. Lateral line incomplete, ending below anterior or middle part of the dorsal fin.

Lips moderately furrowed; no median incision on the upper lip (fig. 47). Processus dentiformis feeble to moderately developed.

The loop of the intestine touches the stomachic dilatation; its ascending branch longer than in *S. fascimaculata* (fig. 49). Chambers of the air

bladder capsule rounded posteriorly; the manubrium connecting them is short (fig. 50). Peritoneum dark brown.

Sexual dimorphism. — The males have a preocular flap and the second (first branched) pectoral fin ray is thickened; apparently the specimens are not fully mature.

Colour pattern. — Body light whitish-grey; 10 to 12 more or less regular crossbars extend from the back below the lateral line, without reaching the ventral side; they are usually wider than the light interspaces. Sparse dark-brownish dots occur in the interspaces between the crossbars; this is why these are not sharply delimited. There is an irregular and variable bar on the base of the caudal fin, darker than the crossbars; its upper fragment is separated in a distinct spot, as in other species of the genus. A blackish spot on the origin of the

dorsal fin and two rows of hardly visible spots on the fin itself; irregular spots on the caudal fin, vaguely arranged in four or five rows.

Range. — Known only from the type-locality on the Kohat Toi River, the same as for *S. fascimaculata* (map 5).

Remarks. — This new species, based on apparently half-grown specimens, seems close to *S. fascimaculata*; it differs from it in the number of dorsal rays, colour pattern, shape of the digestive tract and of the air bladder capsule.

#### Species isolated within the genus

The two following new species cannot be attributed to any species group of *Schistura*.

#### *Schistura shadiwalensis* Mirza & Nalbant, n. sp. Figs. 51-55.

Holotype: ISBB 3369, 27.5 mm standard length, Shadiwal on the Chenab River, a right tributary of the Sutlej River, Indus basin.

Paratypes: ISBB 3370, ZMA 116.447(1), and Mirza's private collection, three specimens, 24.2-27.5 mm, same locality as the holotype.

Derivatio nominis. — After the name of the type-locality.

Diagnosis. — A small-sized *Schistura* species with eight branched dorsal fin rays; scaled body; almost complete lateral line; forked caudal fin; no sexual dimorphism; eight or nine very regular crossbars connected by a slightly marked median longitudinal stripe; silvery peritoneum.

Description. —

D 3/8; A 2/5; P 1/9-10; V 1/.

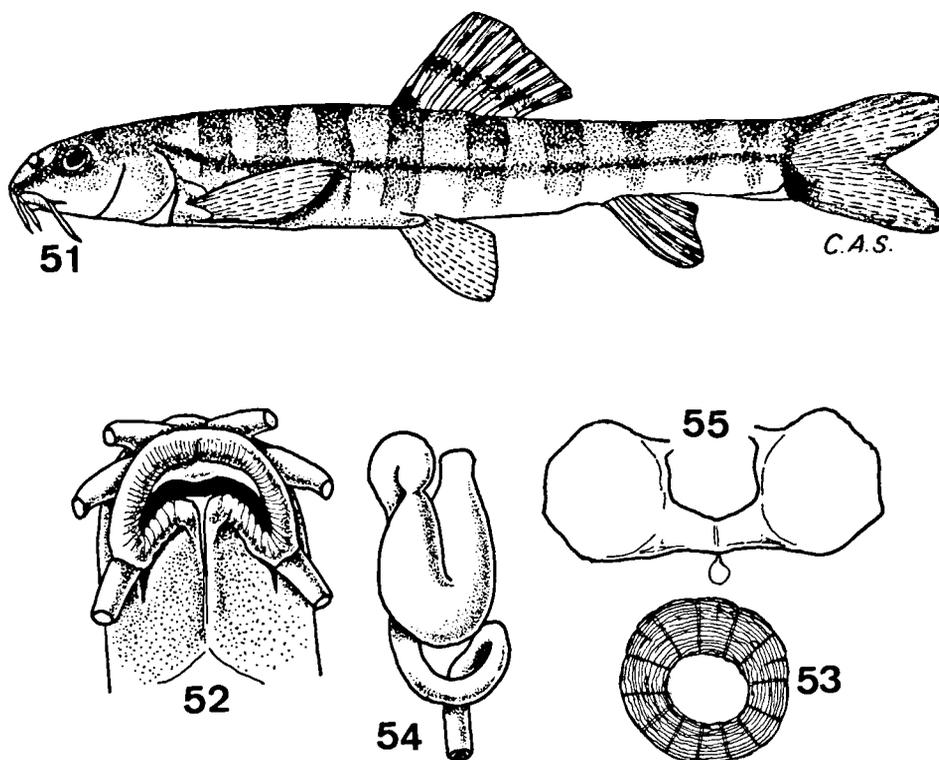


Fig. 51. *Schistura shadiwalensis* n. sp., ISBB 3369, holotype, from Shadiwal on the Chenab River. Fig. 52. Do., mouth of holotype. Fig. 53. Do., subdorsal scale of holotype. Fig. 54. Do., digestive tract of a paratype, ISBB 3370. Fig. 55. Do., air bladder capsule of a paratype, ISBB 3370.

Upper profile slightly convex. Body depth 14.3-16.7% of standard length (15.7% in the holotype); least depth 10.9-11.4% (10.9%); caudal peduncle length 15.0-17.1% (17.1%); predorsal distance 49.0-50.1% (49.0%); preventral distance 49.5-52.5% (51.3%); preanal distance 76.5-80.0%; pectoral-ventral distance 29.4-32.8% (32.8%); ventral-anal distance 25.5-28.0% (25.5%); length of pectoral fins 23.4-25.1% (25.1%); length of ventral fins 19.3-21.6% (21.0%); height of dorsal fin 19.3-21.6% (21.0%); base of dorsal fin 15.9-18.5% (18.5%); height of anal fin 16.7-18.2% (18.2%); base of anal fin 8.8-11.0% (10.6%); length of head 24.1-26.1% (25.1%); snout length 8.2-8.8% (8.7%) and 31.8-34.8% of head (34.8%); eye diameter 5.1-5.6% of standard length (5.1%), 20.4-21.6% of head (20.4%) and 66.7-75.0% of interorbital width (66.7%).

Head only slightly wider than deep. Snout pointed.

Origin of dorsal fin usually closer to tip of snout than to base of caudal fin, in one specimen equally distant; ventral fin insertion slightly behind that of dorsal fin. Edge of dorsal fin straight. Caudal fin forked (shortest rays 57-71% of longest), with rounded lobes. Pectoral fins not reaching insertion of ventral fins, ventral fins not reaching anus; anus slightly in advance of anal fin insertion.

Scales roundish, with large focal zone (fig. 53); they cover most of the body, lacking on back in front of dorsal fin and on breast. Lateral line reaching almost to base of caudal fin, but hardly distinct posteriorly.

Upper lip with a median incision; lower lip rather strongly furrowed (fig. 52).

Loop of the intestine at the level of the posterior margin of the stomachic dilatation (fig. 54). The two halves of the air bladder capsule roundish; the manubrium connecting them is narrow and has a posterior position (fig. 55). Peritoneum silvery.

No sexual dimorphism.

Colour pattern. — Body light greyish-yellow; nine, more rarely eight brownish crossbars on sides, extending almost to the ventral face. They have a

uniform width and are about as wide as the yellowish interspaces. Fine dark dots in the interspaces between the crossbars, being more numerous on a longitudinal stripe on the middle of the sides, that extends almost from the opercle to the base of the caudal fin. A vague stripe on head sides, from the eye below the nostrils to the insertion of the inner pair of rostral barbels. A large spot on the lower part of the caudal fin base, present in all specimens; a blackish spot on the origin of the dorsal fin and an oblique row of quite slight spots across the dorsal fin; other fins unspotted.

Range. — Known only from the type-locality, Shadiwal on the upper reaches of the Chenab River, a right tributary of the Sutlej River (map 5); probably endemic to the Sutlej River basin, left tributary of the Indus.

Remarks. — This species bears some similarity to several species of the *naseeri* group, but is probably not closely related to any of them; its main peculiarities are the silvery peritoneum and the colour pattern.

**Schistura microlabra** Mirza & Nalbant, n. sp.  
Figs. 56-60.

Holotype: ISBB 3869, 35.8 mm standard length (36.6 mm to the end of the scales), Ali Masjid, Khyber Pass, Kabul River basin in northern Pakistan.

Paratype: ZMA 116.448, one specimen, 27.2 mm standard length; Unar River, a small left tributary of the upper Indus near Ugi.

Derivatio nominis. — After *μικρός* = small and *labrum* = lip, because of the small mouth opening.

Diagnosis. — A *Schistura* species with depressed head; small mouth; seven branched dorsal fin rays; apparently no sexual dimorphism; few and small scales, present on caudal peduncle only; short lateral line, reaching below dorsal fin only; some 10 crossbars reaching below lateral line; slightly forked caudal fin; stripe on base of caudal fin interrupted.

Description. —

D 3/7; A 2/5; P 1/10; V 1/6.

Dorsal profile slightly arched. Body depth

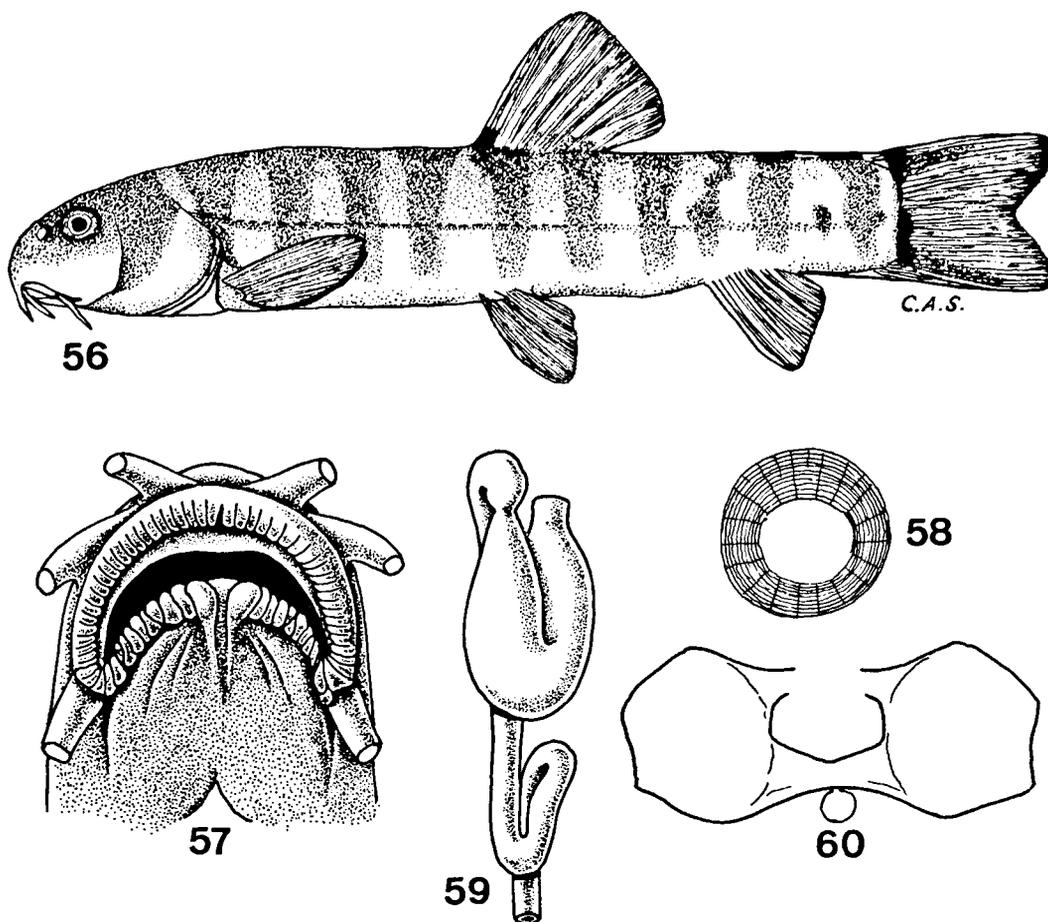


Fig. 56. *Schistura microlabra* n. sp., ISBB 3869, holotype, from Ali Masjid, Kabul River basin. Fig. 57. Do., mouth of holotype. Fig. 58. Do., scale from caudal peduncle of holotype. Fig. 59. Do., digestive tract of holotype. Fig. 60. Do., air bladder capsule of holotype.

17.2% of standard length in the holotype, 17.7% in the paratype; least depth 11.9 and 14.0%; caudal peduncle length 14.0% in both; predorsal distance 56.8 and 56.9%; preventral distance 56.8 and 57.4%; preanal distance 78.0 and 83.5%; pectoral-ventral distance 33.4 and 36.8%; ventral-anal distance 26.0 and 25.0%; length of pectoral fins 21.5 and 22.8%; length of ventral fins 16.7 and 18.8%; height of dorsal fin 19.6 and 19.0%; base of dorsal fin 13.4 and 14.7%; height of anal fin 15.7 and 14.7%; base of anal fin 8.1 and 9.9%; head length 22.3 and 25.8%; snout length 8.9 and 9.1% (37.5 and 31.5% of head); eye diameter 4.2 and 4.8% of standard length, 18.7 and 18.6% of head, 51.5 and 59.0% of inter-orbital width.

Head depressed, much wider than deep. Snout

blunt, narrowed anteriorly. Eyes small and distant, directed upwards.

Origin of dorsal fin closer to tip of snout than to base of caudal fin; origin of ventral fins under or slightly behind that of dorsal fin. Edge of dorsal fin slightly convex. Pectoral fins far from reaching origin of ventral fins, ventral fins far from reaching anal fin. Anus close to origin of anal fin. Caudal fin slightly forked, the shortest ray about 80% of the longest; its lobes are rounded. Caudal peduncle compressed posteriorly, its dorsal margin sharpened in front of caudal fin base, but without a true adipose keel.

Mouth oblique, smaller than in other species of the genus. Upper lip moderately furrowed, with a quite slight median incision (fig. 57). Processus dentiformis moderate.

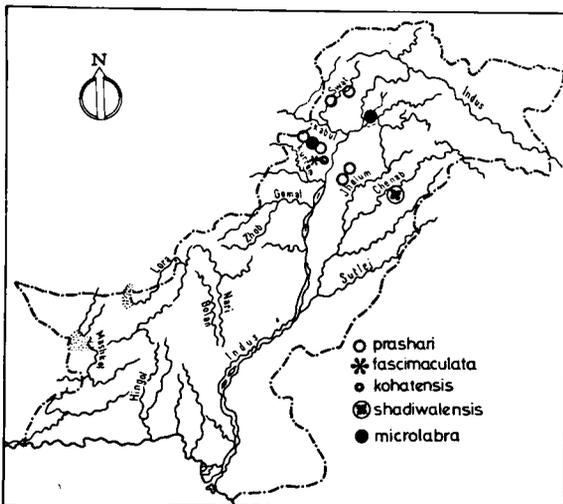
Scales minute, with a large focal zone (fig. 58); they are distant and occur only on the caudal peduncle, being absent anteriorly. Lateral line short, reaching only under base of dorsal fin.

Loop of the intestine below stomachic dilatation (fig. 59). Air bladder capsule without prolongations, with an almost straight posterior margin (fig. 60). Peritoneum dark brown.

Apparently no sexual dimorphism.

Colour pattern. — Light yellowish, with 10 or 11 crossbars of almost uniform width; they are continuous dorsally and extend below the lateral line, without reaching the ventral side. A dark, interrupted bar on the base of the caudal fin, consisting of a dorsal spot and a central and ventral fragment, as in *S. nalbanti*. A dark spot on the origin of the dorsal fin; a vague semilunar blotch on the base of the dorsal fin and vague bars on the margin of both lobes of the caudal fin.

Range. — The two localities where the species was found are distant: Ali Masjid lies in the lower basin of the Kabul River, a right tributary of the Indus, while the Unar River is a small left tributary of the upper Indus, far northeast of the confluence with the Kabul River (map 5).



Map 5. Distribution of *Schistura prashari*, *S. fascimaculata*, *S. kohatensis*, *S. shadiwalensis* and *S. microlabra*.

Comparative remarks. — This new species seems quite isolated within the genus; it resembles both the *rupecula* and *alepidota* groups in having a depressed head and a slightly forked caudal fin; but in both groups the lateral line is longer and the processus dentiformis better developed than in *microlabra*. On the other hand, the species of the *rupecula* group are almost completely scaled, those of the *alepidota* group totally devoid of scales, while *microlabra* has a few scales on the caudal peduncle only, i.e. it is intermediate between the two groups.

No mention is made in this paper of *S. punjabensis* (Hora), a species described from the Salt Range, in the Jhelum River basin, Pakistan (map 4), since no specimens were available to us. More *Schistura* species are expected to be found in Pakistan, besides those described here and *punjabensis*.

#### ZOOGEOGRAPHY

Of the three groups to which the twenty species and one subspecies recorded in this paper belong, one (*alepidota-pakistanica*) is endemic to the basin of the upper and middle Indus in Pakistan and Afghanistan (more exactly: to the basins of three tributaries of the Indus: the Kabul, Gomal and Sutlej rivers). Another group (*kessleri*) ranges mainly in the western inner drainages, but also in the Indus basin; the largest group (*naseeri-baluchiorum*) occurs both in the western drainages and in the Indus basin — and also further east, in the Ganges-Brahmaputra, while the two isolated species have restricted ranges within the Indus basin.

Most species are endemic to restricted areas within the Indus basin, viz. to:

Swat River: *naseeri*;

Zhob River: *pakistanica*, *arifi*;

Kabul River: *paludani*, *microlabra*;

tributaries of the Sutlej River: *nalbanti*, *shadiwalensis*;

Dor River: *afasciata*;

Kohat Toi River: *fascimaculata* and *kohatensis*;

small right tributaries north of the Sutlej confluence: *macrolepis*;

Kurram River and Sün Sakesar Valley: *kessleri lepidocaulis*;

Kurram River and tributaries of the Sutlej River: *curtistigma*.

Wider ranges within the Indus basin have: *S. alepidota* (Swat, Kohat Toi and Dor rivers) and especially *prashari* (Swat, Haro, Kabul rivers, and Sün Sakesar Valley).

Endemic to the inner drainages west of the Indus are: *S. kessleri kessleri* (most inner drainages of Pakistan, Afghanistan), *anambarensis* (basins of the Nari and Lora rivers), *baluchiorum* (Kaman Beji and lake Hamun-i-Mashkel basins) and *barnaiensis* (Kaman Beji River basin).

A few species are distributed both within the Indus basin and the inner drainages: *S. kessleri* sensu lato (most inner drainages, then Kurram River and Sün Sakesar Valley in the Indus basin), *S. lindbergi* (basins of Farah-Rud, Beji and Rakhshan rivers, inner drainages, then Unar River, upper Indus basin) and *machensis* (a tributary of the Bolan River, Indus basin, and Kaman-Beji River basin).

There are four pairs of vicariant species within the *naseeri-baluchiorum* group:

*arifi* and *curtistigma*, both in the Indus basin; *barnaiensis* (inner drainage) and *afasciata* (Indus basin), the first one plesiomorphic in respect to the colour pattern, the second in respect to the length of the lateral line;

*baluchiorum* and *anambarensis* in the inner drainages; the first one is apparently plesiomorphic in respect to the length of the lateral line;

*machensis* (inner drainage) and *macrolepis* (Indus basin); the first one, with an incomplete lateral line, is apomorphic.

The only species that is known to include two subspecies is *S. kessleri*; the nominal subspecies, from the inner drainages, that has lost any traces of scales, is apomorphic in comparison with *lepidocaulis* from the Indus basin.

Hence, in two cases the taxon from the inner drainages is apomorphic, that from the Indus basin plesiomorphic; in a third case (*barnaiensis-afasciata*), the sister species from the inner drainage is apomorphic in one character, that from the Indus basin in another.

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The authors also wish to express their sincere thanks to Miss Cristina A. Sirbu for drawing part of the illustrations (marked with C.A.S.).

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