Ichthyol. Explor. Freshwaters, Vol.1, No 3, pp 269-276, 1 fig., 3 tabs., July 1990

Ichthyological and limnological observations on the Sali river basin (Tucuman, Argentina)

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The ichthyofauna of the Sali river basin, Tucuman, Central Argentina is analyzed. Twenty three species and two subspecies were collected, of which nine species and one subspecies are new for the Sali river basin: *Cheirodon interruptus, Odontostilbe microcephala, Cyphocharax* cf. *modestus, Jobertina rachowi, Pimelodus albicans, Trichomycterus alterum, Corydoras paleatus, Jenynsia lineata alternimaculata, Bujurquina vittata* and *Cichlasoma portalegrense*. This represents a 37% increase in the known diversity of the Sali river fish fauna. The Paranensean composition of this fauna lends support for a western extension of the Parano-platense zoogeographic province. The hypothesis is advanced that the lack of tributaries and therefore the lack of environments of creek type in the Dulce river explains the observed impoverishment in the number of species compared with the Sali. Physicochemical data obtained at ten localities show that the mean pH is higher in the Sali river than in the upper Parana and Paraguay rivers, but is nearly the same as that in Cordoba environments. Total dissolved solids are less than in Pampean lakes or Cordoba creeks. At all localities in the Sali river $C0_3 H^-$, Ca^{2+} and Na^+ were the most abundant ions.

Introduction

Many authors (Lachner et al., 1976; Margalef, 1983; Lowe-McConnell, 1987) have mentioned the need for research relating to the faunistic composition and ecology of South American fresh water environments. Bohlke et al. (1978) emphasized the need for studies of the ichthyofauna in many areas, and for collecting in many regions before fish become rare or disappear.

In spite of a considerable amount of research done on Argentine fishes during the last twenty years (see Lopez et al., 1981, 1982, 1987) an extensive area of central Argentina has only been studied in recent years. Menni et al. (1984) provide a complete list of the ichthyofauna from the highlands in Cordoba and San Luis provinces, including a faunal comparison among several basins and limnological observations of sampled streams in eleven basins. Casciotta et al. (1989) report the first fish fauna known from the Salado river in Santiago del Estero province, as well as new species from the Dulce river, and also discuss the limnology of the Salado basin.

The Sali river basin (Fig. 1) includes Tucuman province and parts of Salta and Catamarca provinces. Its main tributaries arise in the Calchaquies and Aconquija highlands. The river is called Tala until its confluence with the

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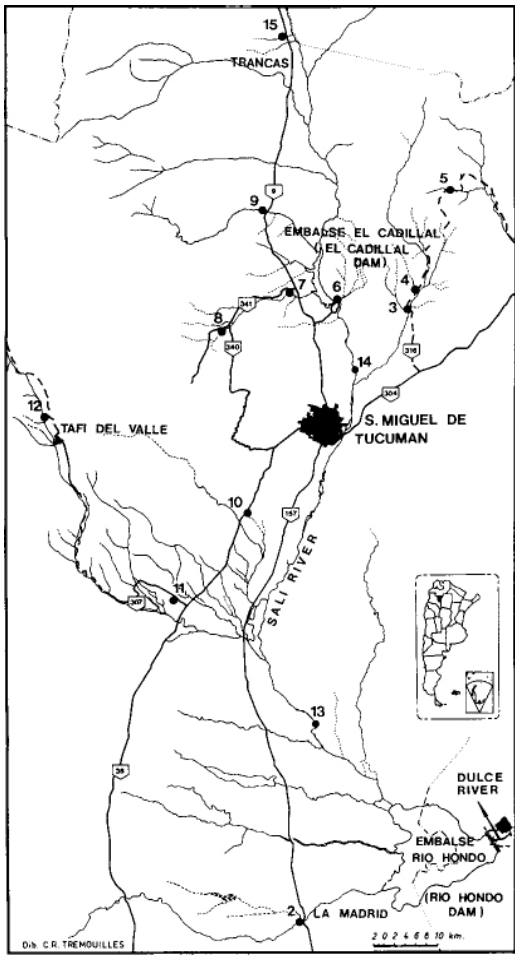

Fig. 1. Localities sampled in the Sali river basin. Num-bers as in Appendix.

Candelaria. With the name Sali it crosses through 250 km of Tucuman province. In Santiago del Estero province it is named the Dulce river (Mazza, 1961; see Casciotta et al., 1989).

In this paper we report the composition of the Sali river basin ichthyofauna, compare the composition of the fish fauna in different sections of the Sali-Dulce river system and discuss the distribution of species. Water physicochemical characteristics are compared with those from other Argentinian basins. The information is analyzed within the zoogeographic framework provided by Ringuelet (1961, 1975) and Arratia et al. (1983).

Material and methods

Most of the material was collected by the authors during two trips to the Sali river basin in May 1980 and April 1983 and deposited in the ichthyological collection of the Museo de La Plata (MLP). Additional material was obtained from Mrs. Butti de Lozano, from the Museo de La Plata and from the Instituto Miguel Lillo, Tucuman (IML). When no collector is mentioned, the material was gathered by RCM, HLL and JRC. Detail of localities is listed in the Appendix, together with the material examined.

The sampled environments are mountain creeks, rivers with rocky bottom and transparent waters, and plain creeks and rivers. In rivers with large flow, the banks or marginal environments were sampled. Sampling was made with a beach seine 15 m wide with a 10 mm mesh, hand nets and the ichthyocide Pronoxfish.

The systematic arrangement used in Tables 1 and 2 mainly follows Greenwood et al. (1966), but Géry (1977) is used within the Characoidei. For the comparison of different sections of the river, Long's (1963) index was used (see Matson, 1976 and Menni et al., 1984). For the obtention of physicochemical parameters, one liter water samples fixed with chloroform were taken at the collecting place just before fishing. The analysis were made by the Laboratory of Chemistry of the La Plata Institute of Limnology according to APHA (1971) methods.

Results

The composition of the fish fauna from the Dulce and Sali rivers is shown in Table 1. The table has been composed with data from Ringuelet (1975) on the Sali river basin, those provided by Casciotta et al. (1989) on both rivers, and our own data on the Sali river. Table 2 shows the species gathered by the authors from the Sali river basin environments, detailing new records for the basin and presence of species in each locality. Table 3 includes the physicochemical data of the water.

Discussion

Distributional and ecological conclusions. In a zoogeographical sense, the Sali basin fish fauna belongs in the Paranensean dominion of the Subtropical province (Ringuelet, 1961, 1975). Ringuelet (1975) reports from the Sali river basin twenty six species and an undetermined species of *Trichomycterus,* to which *Loricaria tucumanensis* described by Isbrücker (1981) must be added.

We have found thirteen species already reported by Ringuelet. Besides, we have captured nine species and a subspecies which are new reports for the basin, namely *Cheirodon interruptus, Odontostilbe microcephala, Cyphocharax* cf. *modestus, Jobertina rachowi, Pimelodus albicans, Trichomycterus alterum, Corydoras paleatus, Jenynsia lineata alternimaculata, Bujurquina vittata* and *Cichlasoma portalegrense* (Table 2). This represents an increase of 37% for the Sali river basin and hence for the Tucuman province. These fishes are typically Paranensean species; *T. alterum* being the only Andean species. Ringuelet (1975) comments that «With the exception of the trichomycterids and some species, as *Rineloricaria catamarcensis,* which do not live in the Paranensean territory, all the ichthyofauna from Tucuman rivers is composed by the same species that could be found in any place of the Subtropical pampasia» and that «There are ecotonal sympatry among highlands (or Andean) and Paranensean forms, with a clear dominance of the latter» (in the studied area). This situation does not change with the new reports which have low percentage (1 sp. = 10%) of Andean forms.

The Sali and Dulce rivers are physically divided by the Rio Hondo dam, which forms a lake of 330 km^2. Data from Casciotta et al. (1989) and those gathered for this paper show the following number of species. For the Sali river 28 species were known. Twenty five were obtained by us, of which 10 are new reports for the basin. Total number of species for the Sali river is 38 species (the introduced *Gambusia affinis is* not considered).
Twenty one species were known for the Dulce river. We have collected 17, of which 6 are new reports. Total number of species for the Dulce river is 27.

These data show that the Dulce river is somewhat poorer than the Sali. The similarity value obtained applying Long's index is 44.8%. It seems too low for sections of the same river. An explanation of this difference is suggested below:

The Sali river samples have been collected mainly in tributary creeks, presumptively stable and not disturbed by human action, which constitute marginal environments different from the main course. In the Dulce river basin, sampling has been made in artificial or altered locations, due to the absence of such tributaries or other small environments related to the river. We suggest that the above diversity pattern reflects the amount and quality of habitats available in each section, not only for sampling but for the organisms as well. Supporting this interpretation, Mazza (1961) mentions that the Sali basin in Tucuman is formed by tributaries from the Calchaqui and Aconquija highlands, whereas the Dulce river in plain region in Santiago del Estero receives almost no tributary.

Considering Table 1 in this ecological context and Ringuelet's (1975) opinion quoted above, the absence in the Dulce river of three species of *Trichomycterus* must be noted. They are usually living in fast current and well oxygenated waters in Subandean environments but are lacking in the Dulce basin.

Faunal conclusions. Lopez et al. (1984) mention that it was certain that new searches in Argentina would increase the known distribution of many groups, an assumption confirmed by the new extensions of distribution found during the last years (Lopez et al., 1980; Miquelarena et al., 1981; Lopez et al., 1984 and Menni et al., 1984). The more than 35 % increase of fish species for the Sali basin based on the present small collection supports this conclusion.

Distributional novelties can be summarized as follow:

Cheirodon interruptus was found at the Cadillal dam and in Calimayo creek. This species has been reported from the lower Uruguay, La Plata and lower Parana rivers, from Tala in Salta (Ringuelet et al., 1967a), from the Salado basin in Buenos

Table 1. Species composition of the Dulce and Sali rivers basin.

	Dulce river	Sali river
Roeboides bonariensis	x	
Oligosarcus hepsetus		x
Oligosarcus jenynsi		x
Salminus maxillosus	x	x
Aphyocharax rubropinnis	x	
Acrobrycon tarijae		x
Astyanax eigenmanniorum	x	
Astyanax fasciatus	x	
Astaynax bimaculatus paraguayensis	x	x
Bryconamericus iheringi		x
Cheirodon interruptus		x
Odontostilbe microcephala		x
Serrasalmus rhombeus marginatus		x
Serrasalmus nettereri	x	x
Hoplias m. malabaricus	x	
Leporinus obtusidens	x	x
Leporinus pellegrini		x
Prochilodus platensis	x	x
Cyphocharax cf. *modestus*		x
Characidium fasciatum		x
Jobertina rachowi		x
Parauchenipterus albicrux	x	
Parauchenipterus striatulus	x	
Heptapterus mustelinus	x	x
Pimelodella laticeps		x
Pimelodus albicans	x	x
Pimelodus clarias maculatus	x	x
Luciopimelodus pati	x	
Trichomycterus alterum		x
Trichomycterus corduvense		x
Trichomycterus spegazzinii		x
Trichomycterus sp.		x
Callichthys callichthys	x	
Corydoras paleatus		x
Hoplosternum littorale	x	x
Loricaria simillima		x
Loricaria tucumanensis		x
Loricariichthys anus	x	
Paraloricaria vetula	x	
Rineloricaria catamarcensis		x
Rineloricaria phoxocephala		x
Hypostomus commersoni	x	x
Hypostomus cordovae		x
Hypostomus robini	x	x
Jenynsia lineata	x	x
Jenynsia lineata alternimaculata		x
Gambusia affinis		x
Cnesterodon decemmaculatus	x	x
Synbranchus marmoratus [1]		
Bujurquina vittata		x
Cichlasoma facetum	x	
Cichlasoma portalegrense	x	x

Aires province and the Pampean plain south of the Salado river basin. Menni et al. (1984) summa-rize distribution records from San Juan province, the Desaguadero river in Mendoza and the Colorado river in Rio Negro province, and also report it from several rivers basins in Cordoba. Recently Casciotta et al. (1989) cited the occurence of C. *interruptus* in the Salado river in Santiago del Estero province (this is not the Salado river quoted above). *Cheirodon interruptus is* more widely distributed than indicated in Ringuelet et al. (1967a). Available data show that it is common both in lotic and lentic environments. Probably as a result of the interruption of previous wide distributions, species of the genus have remained isolated in small basins (see Ringuelet, 1975 and Menni et al., 1984).

Our records for the occurence of *Odontostilbe microcephala* in the Marapa and Calera rivers suggests a larger distribution for this species in north-west Argentina, where it seems to be more com-mon than in the middle and lower Parana river. The species has been reported from the Piedras river in Salta, the Parana delta environments, Corrientes province and the Paraguay and upper Parana rivers (Ringuelet et al., 1967a). Additional records are also reported for the Paraguay and La Plata rivers and the Juramento river in Salta (Ringuelet, 1975).

Cyphocharax cf. *modestus,* formerly reported from Paraguay, is a new report for Argentina, but the identification needs to be confirmed.

The presence of j*obertina rachowi* in the Sali basin largely extends its distribution southward. Several reports (Pozzi, 1945; Travassos, 1952; Bonetto et al., 1969; Ringuelet et al., 1978 and Lopez et al., 1980) show that *J. rachowi* seems to have a relatively wide distribution in north eastern and eastern Argentina, from Resistencia to the La Plata city neighborhood.

Pimelodus albicans has been found at the Calera river, 400 km west from the Parana river, agreeing with the reports from the Dulce river (Mastrarrigo, 1947; Casciotta et al., 1989). Distribution of this species in Argentina as reported by Ringuelet et al. (1967a) and Ringuelet (1975) comprises the Paraguay river, middle and lower Uruguay river, middle and lower Parana river and La Plata river.

Table 2. Species sampled in the Sali river basin. Asterisks denotes new reports for the basin. Localities are: **2** Marapa river; **3** Calera river; **4** Artaza creek; **5** Nio river; **6** El Cadillal dam; **7** Las Tipas river; **8** Tapia river; **9** Bridge at Vipo; **10** Calimayo creek; **11** La Ramadita creek; **12** Tafi-Amaicha road; **13** Los Gomez; **14** La Aguadita dam; **15** El Tala creek; **16** «Tucuman».

Localities	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ologosarcus jenynsi		x			x			x							
Acrobrycon tarijae		x													
Astyanax fasciatus		x								x		x			
Astyanax bimaculatus paraguayensis	x	x			x			x	x	x		x			
Bryconamericus iheringi		x			x			x	x	x		x			
Cheirodon interruptus					x			x	x						
Odontostilbe microcephala	x	x													
Prochilodus platensis		x										x			
Cyphocharax cf. *modestus*									x						
Characidium fasciatum		x			x										
Jobertina rachowi									x						
Heptapterus mustelinus		x	x				x	x							
Pimelodella laticeps									x						
Pimelodus albicans		x													
Trichomycterus alterum		x	x					x							
Trichomycterus corduvense											x				
Trichomycterus spegazzinii						x	x	x							
Corydoras paleatus									x			x			
Hypostomus cordovae		x			x								x	x	
Cnesterodon decemmaculatus									x						
Gambusia affinis												x			
Jenynsia lineata alternimaculata		x		x		x									
Jenynsia lineata								x							
Bujurquina vittata															x
Cichlasoma portalegrense									x						x

Lopez (1985) has found it at the Bermejo river in the Salta province.

We extend the distribution of *Trichomycterus alterurn* East to the Sali river basin, at least down to about 500 m a. s. 1. The species was known (Ringuelet et al., 1967a; Arratia et al., 1983) from Los Sauces river and the Hunachi valley in La Rioja province, and from the Rio Grande basin in Jujuy province, at heights between 1,000 and 3,000 m.

The presence of *Corydoras paleatus* in the Sali river basin extends its distribution in central Argentina northern than previous localities (see complete references in Menni et al., 1984). It has been found neither in the Dulce river nor in the Salado river in Santiago del Estero (Casciotta et al., 1989).

Jenynsia lineata alternimaculata is here reported for the Sali basin, southern of previously known localities. The species, described from Bolivia, has a rather restricted distribution in that country and northwestern Argentina. Ringuelet et al. (1967a) report it in Argentina from the Lipeo river, a tributary of the Bermejo, and Ringuelet (1975) from the same and the Juramento river. Arratia et al. (1983) report it from the Bermejo river.

Specimens of *Bujurquina vittata* here examined come from «Tucuman» (no detailed locality). This report gives continuity between the northern references and that of Berg (1895) from the El Tala creek in Catamarca province. This species is well represented in the upper and middle Parana river and its tributaries in Misiones, Corrientes, Chaco and northern Santa Fe. Inside Formosa it is found in the Paraguay, Pilcomayo and Bermejo rivers tributaries (Casciotta, pers. comm.).

Cichlasoma portalegrense is a new report from the Sali river basin and from «Tucuman» (without precision). This species, recently reported from the Salado and Dulce rivers in Santiago del Estero (Casciotta et al., 1989), is widely distributed in

Table 3. Sali river basin, physico-chemical parameters of waters.

Locality	2	3	4	6	7	8	9	10	11	12
pH	8.35	7.86	8.65	8.78	8.60	8.55	7.48	7.05	6.98	7.55
Total dissolved solids ($mg\text{-}l^{-1}$)	494	909	508	420	1059	263	243	312	46	121
Conductivity at 20°C $\mu S.cm^{-1}$	324	830	549	497	1200	256	208	350	30	114
CO_3^{2-} (mg/l)	4.80	0.0	26.5	21.7	14.5	14.5	0.0	0.0	0.0	0.0
CO_3H^-	117.7	291.8	274.6	122.6	122.6	139.8	107.9	230.5	20.0	69.9
Cl^-	11.5	15.3	5.2	55.3	153.6	8.7	19.1	8.7	7.3	10.9
SO_4^{2-}	30.0	121.0	33.0	28.0	138.0	3.0	7.0	11.0	6.4	3.7
Na^+	110.0	56.7	26.0	50.0	160.0	15.3	20.0	37.3	2.6	14.8
K^+	4.2	4.7	3.5	3.8	6.8	2.2	3.2	5.3	1.8	2.9
Ca^{2+}.	34.8	157.7	84.8	40.7	125.5	39.0	30.5	50.9	4.2	15.2
Mg^{2+}	9.7	38.3	31.5	7.2	36.5	11.4	8.1	15.9	3.6	3.2
Mg/Ca	0.46	0.40	0.61	0.29	0.48	0.48	0.43	0.51	1.43	0.34
Ca + Mg/Na + K	0.52	4.27	5.59	1.15	1.30	4.00	2.30	2.18	3.40	1.44
Water temperature (°C)	19.0	20.5	21.5	22.0	25.5	19.5	21.5	-	19.2	18.6

northern and central Argentina, including the Parana river basin in Misiones, Corrientes, Chaco, Entre Rios; the Paraguay river in Formosa, and tributaries of the Bermejo river in Salta.

Limnological conclusions. Water temperature in the field (autumn of the southern hemisphere) ranges from 18.6 to 25.5°C (N = 14). The pH values range from 7.05-8.78, a variation less than that of meridional environments of Buenos Aires province (39°S) or streams in Cordoba (32°S) (Menni et al., 1984,1988). Differences of pH in the Parana river (as reported by Golterman, 1975 and Bonetto and Lancelle, 1981) were lower. Mean value of pH (K = 7.98) in our samples is higher than in the upper Parana and Paraguay rivers (Golterman, 1975) but similar to that in areas from Cordoba (near to places treated here) where 31 localities give a mean of 7.82, and southern environments from the Buenos Aires province where the mean is 7.92 (Menni et al., 1984,1988).

Total dissolved solids values range from 45.83 to 1,059 mg. I' (K = 437.4). In general terms these are lower than those in the Pampean lakes («lagunas») (Ringuelet et al., 1967b) and the mean is well under that of Cordoba environments water (744 $mg\text{-}1^{-1}$ for N = 31). Conductivity values at 20°C range from 30 to 1,200 $\mu S.cm^{-1}$

Half of the localities show CO_3^{2-} according to high pH values. In all of them CO_3H^- was the most abundant anion ranging from 20 to 291.8 $mg\text{-}l^{-1}$. The most abundant cations were Cat' and Na+ The ratio Mg/Ca range from 0.29 to 1,43. The ratio Ca + Mg/N + K shows values higher than in the Pampean lakes or Cordoba environments. Values of total anions and cations are much higher than in the Parana or Paraguay rivers.

Acknowledgments

This report has been written with support from the SECYT and the CONICET (Argentina). The authors wish to thank Richard Madden (Duke University) and Alicia Escalante (La Plata University) for their help with the English text, Mrs. Butti de Lozano for loaning material and the staff of the Chemistry Laboratory, ILPLA, for water analysis.

Appendix. Sampled localities and material examined. Locality numbers refer to Figure 1. **ChD** means a locality where physicochemical parameters were obtained.

Loc. 2. Marapa river, across the Route 157. May 1980. ChD. *Astyanax bimaculatus paraguayensis,* MLP 15-IX-88-5,4: 40.5-51.4 mm SL. *Odontostilbe microcephala,* MLP 7-111-89-2, 2: 35.7-45.0 mm SL.

Loc. 3. Calera river. May 1980. ChD. *Oligosarcus jenynsi,* MLP 21-11-90-7,1:94.1 mm SL. *Acrobrycon tarijae,* MLP 3-X-88-2,3:37.6-54.5 mm SL. *Astyanax fasciatus,* MLP 3-X-88-3,1: 73.8 mm SL. *A. bimaculatus paraguayensis,* MLP 15-IX-88-4, 6: 33.7-47.8 mm SL. *Bryconamericus iheringi* (not preserved). *Odontostilbe microcephala,* MLP 7-111-89-1, 47: 31.4-45.0 mm SL. *Prochilodus platensis* (not preserved). *Characidium fasciatum* (sensu Ringuelet et al.,

1967a), MLP 3-X-88-4, 4: 39.0-55.0 mm SL. *Heptapterus mustelinus,* MLP 21-11-90-2, 1: 53.1 mm SL. *Pimelodus albicans,* MLP 19-X-88-1, 5: 91.5-149.0 mm SL. *Trichomycterus alterum,* MLP 14-IX-88-1, 2: 68.3-105.0 mm SL. *Hypostomus cordovae,* MLP 1-X-86-16, 16: 119-301 mm SL. *Jenynsia lineata alternimaculata,* MLP 14-IX-88-8, 2: 32.4-37.2 mm SL.

Loc. 4. Artaza creek. May 1980. ChD. *Heptapterus mustelinus* (not preserved). *Trichomycterus alterum,* MLP 14-IX-88-2, 7: 32.7-42.6 mm SL.

Loc. 5. Nio river. May 1980. *Jenynsia lineata alternimaculata,* MLP 14-IX-88-10,11: 28.2-44.2 mm SL.

Loc. 6. El Cadillal dam. May 1980. ChD. *Oligosarcus jenynsi,* MLP 21-11-90-6, 3: 53.7-80.4 mm SL. *Astyanax bimaculatus paraguayensis,* MLP 21-I1-90-5, 32: 23.4-66.6 mm SL. *Bryconamericanus iheringi,* MLP 15-IX-88-3, 12: 20.4-49.2 mm SL. *Cheirodon interruptus,* MLP 14-IX-88-6, 1: 41 mm SL. *Characidium fasciatum,* MLP 3-X-88-6, 1: 52.4 mm SL. *Hypostomus cordovae,* IML 01001, 1: 123.3 mm SL.

Loc. 7. Las Tipas river. May 1980. ChD. *Trichomycterus spegazzinii,* MLP 3-X-88-8, 3: 33.4-80.4 mm SL. *Jenynsia lineata alternimaculata,* MLP 14-IX-88-4, 2: 37.5-41.7 mm SL.

Loc. 8. Tapia river at Raco (shallow water along road sides). May 1980. ChD. *Heptapterus mustelinus,* MLP 6-X-88-1, 9: 65.0-117.0 mm SL. *Trichomycterus spegazzinii,* MLP 5-X-88-3, 5: 52.8-72.4 mm SL.

Loc. 9. Bridge at Vipo (pool under the bridge). May 1980. ChD. *Oligosarcus jenynsi,* MLP 5-X-88-1, 2: 80.3-85.4 mm SL. *Astyanax bimaculatus paraguayensis,* MLP 15-IX-88-6, 10: 40.5-50.9 mm SL. *Bryconamericanus iheringi,* MLP 15-X-88-1, 4: 35.2-44.2 mm SL. *Cheirodon interruptus,* MLP 14-IX-88-7, 1: 36 mm SL. *Heptapterus mustelinus,* MLP 6-X-88-2, 9: 50.0-134.0 mm SL. *Trichomycterus alterum,* MLP 14-IX-88-3, 7:36.0-44.4 mm SL. *T. spegazzinii,* MLP 3-X-88-1, 13: 36.4-52.3 mm SL. *Jenynsia lineata,* MLP 14-IX-88-9, 2: 24.9-42.4 mm SL.

Loc. 10. Calimayo creek, near Lules. May 1980. ChD. *Astyanax bimaculatus paraguayensis,* MLP 5-X-88-2, 5: 43.5-63.6 mm SL. *Bryconamericanus iheringi,* MLP 15-IX-88-2, 6: 24.0-50.4 mm SL. *Cheirodon interruptus,* MLP 14-IX-88-5, 15: 28.0-40.0 mm SL. *Cyphocharax* cf. *modestus,* MLP 7-111-89-3, 2: 61.6-86.0 mm SL. *Jobertina rachowi,* MLP 3-X-88-5, 16: 17.1-33.8 mm SL. *Pimelodella laticeps,* MLP 21-11-90-4, 7: 18.4-48.9 mm SL. *Corydoras paleatus,* MLP 14-IX-88-11, 15:17.7-37.0 mm SL. *Cnesterodon decemmaculatus,* MLP 21-11-90-3,3:15.4-19.7 mm SL. *Cichlasoma portalegrense,* MLP 17-l-84-58,3:48.3-91.0 mm SL.

Loc. 11. La Ramadita creek, on the road to Tafi del Valle, 5 km from Route 38. April 1983. ChD. *Astyanax fasciatus,* MLP 15-IX-88-9, 10: 59.0-76.0 mm SL. *A. bimaculatus paraguayensis,* MLP 15-IX-88-7,1: 43.2 mm SL. *Brycona-mericanus iheringi,* MLP 21-11-90-1, 2: 47.8-49.6 mm SL.

Loc. 12. A creek on the road from Tafi del Valle to Amaicha del Valle, about 10 km from Tafi del Valle, between the pine forest and the road. April 1983. ChD. *Trichomycterus corduvense,* MLP 3-X-88-7, 7: 23.0-51.9 mm SL.

Loc. 13. Los Gomez, Reales department. A little creek related to the Sali river. July 1984. (pers. coll. of Mrs. Butti de Lozano). *Astyanax fasciatus,* 8:41.8-69.8 mm SL. *A. bimaculatus paraguayensis, 7:* 24.5-59.3 mm SL. *Brycona-mericanus iheringi, 1:* 32.9 mm SL. *Prochilodus platensis,* 1: 119.2 mm SL. *Corydoras paleatus,* 1: 25.0 mm SL. *Gambusia affinis, 1:* 18.9 mm SL.

Loc. 14. La Aguadita dam, on the Sali river (no collec-tion date, coil. R. A. Ringuelet). *Hypostomus cordovae,* MLP 24-XI-39-8,1:117.8 mm SL.

Loc. 15. El Tala creek (no collection date, coll. J. M. Chani). *Hypostomus cordovae,* IML 01009,1:152 mm SL.

Loc. 16. Tucuman (lacking other data, coll. A. Umana). *Bujurquina vittata,* MLP 20-XI-46-19, 20-XI-46-20, 20-XI-46-22, 4: 38.8-67.3 mm SL.

Loc. 17. Tucuman (lacking other data, coll. A. Umana). *Cichlasoma portalegrense,* MLP 20-XI-46-21, 1: 48.1 mm SL.

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Received 6 October 1989
Revised 29 June 1990
Accepted 31 July 1990

Versión Electrónica

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