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Cynopocilus - Cynolebias - (Leptolebias)

In the pet magazine Stuekultur Dec. 58 issue I had a popular article on the South American killies of the genus *Cynolebias*, which may interest the breeders of these fishes. This article is part of a series on the annual fishes within killies.

Within the egg-laying-tooth-carps that we find in Africa and in South America in the subfamily of Fundulinae, the tribus Rivulinii, there are several genera, in which all or only some of the species could be called "annual fishes" in the sense of Myers. These fishes have developed an ability to withstand drying out of their natural waters, in the way that their eggs survive in the dry ground.

The annuals of Africa are mostly found in the genus of *Nothobranchius*, where all aquarium kept species, as far as I know, are real annuals. Within the genus of *Aphyosemion* however, only one species could be called a "real annual" compared with the *Nothobranchius*. This is the *Aphyosemion sjoestedti*, subgenus of *Fundulopanchax* are not a homogeneous group and only the species related to *Aphyosemion gulare* (the "gulare group") seems to have developed properties that bring them close to the annual fishes.

The killies of South America contain several genera of annuals. Also here the different genera are not developed to the same degree as annual fishes. The genus *Pterolebias* has 4 species and these all seem to live in the great flooded areas near the big rivers. *Pterolebias longipinnis* in the lower Amazonas (?), *Pt. peruensis* in the upper Amazonas (?), *Pt. zonatus* in the lower Orinoco and *Pt. bokermanni* in the great swamps around the Rio Guapore in SW Brazil. The genus *Rachovia* has one (two) species. The best known is *R. brevis* in the flooded areas near Rio Magdalena in northern Columbia and the more doubtful species, *R. hummelincki* in the NW of the great lake of Maracaibo in the NW of Venezuela. No species of *Rachovia* is on the market now.

The genus *Austrofundulus*, which in some way resembles the African genus *Nothobranchius*, lives in the flooded plains near Maracaibo and has only two species (one of which has two subspecies): *A. transilis* and *A. stagnalis*.

Maybe also the genus *Neofundulus* in Paraguay are annual fishes. The natural conditions in the area where they live point in the direction that they are annuals. There are only two species known: *N. ornatipinnis* and *N. paraguayensis*.

The genus *Cynolebias* (included the subgenera *Cynopoecilus* and *Leptolebias*) should hold about 26 species, but many of these may be synonyms and need further examination by zoologists. The "real" *Cynolebias* holds 18 species, the *Leptolebias* about 6 species, and the *Cynopoecilus* only two species. The first importations of live *Cynolebias* came to Germany as early as in 1906 (*C. bellottii*), but it came to no breeding results worth mention. During the following years, many other species were imported to Germany. *C. nigripinnis* (1908), *C. wolterstorffi* (1910), *C. adloffii* (1922) and *C. schreitmuelleri* (1934). In spite of the fact that information on the very particular ecology of this genus (published in 1910 and later) aquarists were not able to breed these species and most of the importations soon became extinct. The aquarists did not draw the full consequences of the ecological information about these odd fishes. After the war a few German aquarists developed the breeding procedure and, from them, the species were bred by large numbers in many countries.

After World War II, the species *C. bellottii* and *C. nigripinnis* about 1950 came once more to Germany and from there they spread to other countries. Later on, the small *C. ladigesi* (also called "splendens") came in 1955 and then *C. whitei* in 1957/58? (called "*Pterolebias elegans*").

Here is some climatic information:

From the mouth of Rio Amazonas and eastwards, the annual rainfall decreases rapidly and at Fortaleza in the Ceara Province it reaches "only" 500 mm (20 inches). Compared with the annual rainfall in northern Europe, this should not make a dry climate, but in this much warmer climate and also caused by the more dry air, the 500 mm can not make a moist climate. Also the rainfall is not evenly distributed through the year. The dry season is long lasting, from May to October. Southward from Fortaleza the annual rainfall decrease to 250 mm (10 inches) and here we have an arid climate. During the dry season the sun is merely constantly shining and the air is very dry. Most of the rain comes in Dec.-April. Highest temperature is 42 C, lowest only 12 C. I have not been able to find many water analyses from this area, but the few I found show up to 3000 ppm of NaCl and great hardness. Here in Ceara live two species of *Cynolebias*: *C. antenori* and *C. regani*. They have not been kept as aquarium fishes. Described by Myers in 1952/53. These should be real annual fishes.

More eastward of Fortaleza towards the Cape Sao Roque, the rainfall increases to about 1000 mm a year, but still it is very unevenly distributed, giving a rainy season and a dry season. 60-80% of the total rainfall falls during the wintertime. This climate holds down the 12-14 degree Southern Latitude at Bahia, where at least one species, *C. porosus*, lives, near Recife (Pernambuco, at 8 degrees Southern latitude). Total rainfall is 1000 mm a year.

From 10 to 12 degrees Southern Latitude, the rainfall is more evenly distributed through the year and rain falls in winter as well as in summer. Here no *Cynolebias* is collected.

From 20 to 30 degrees Southern Latitude, there is much more rain in the summer than in the winter. Here is a lot of *Cynolebias*. The center of the distribution of the subgenus *Leptolebias* is also here: *Cynolebias* (*Leptolebias*) *marmoratus*, *C. (L.) minimus*, *C. (L.) ladigesi*, *C. (L.) opalescens* and *C. (L.) splendens*. All are found near Rio de Janeiro. In this area also some "real" *Cynolebias* are found: *C. constanciae*, *C. whitei* and one more or less doubtful *Cynopoecilus*: *C. (Cp.) tichleri*.

From Rio de Janeiro and down to Buenos Aires *Cynolebias* could be found in all coastal areas. The southern *Leptolebias* lives in the Parana Province: *C. L. aureoguttatus*). And here we also find the type species of *Cynopoecilus*: *C. Cp. melanotaenia*. More southwards in the Santa Catarina Province we find *C. carvalhoi* and near the frontier to Uruguay also *C. adloffii* and *C. wolterstorffi*. From this province the genus spread into the lowlands of Uruguay and Argentina. All the local species are "real" *Cynolebias*: *C. elongatus*, *C. bellottii* (the type species of the genus), *C. robustus*, *C. gibberosus*, *C. holmbergi*, *C. nigripinnis* and *C. spinifer*. The rainfall here is rather high - 1000-1500 mm a year and it is rather evenly distributed through the year, but the dry air during summer time makes this season rather dry.

There is some information on the natural conditions in particular for the well-known *C. bellottii*: "Rain begins in March and the small ponds and pools in the Argentine Pampa which until now have been dry, are now filled with water. Now the fry of the various *Cynolebias* hatch. In the southern winter, from June-August and the southern spring Sept.-Oct., the fry grow up and spawn in the mud of the small and large pools. But during the southern summer, from Dec. to Feb. the higher temperature and the high and dry winds cause evaporation and soon every pond and pool dries up again. Now the cycles of the *Cynolebias* is coming to an end after 6-8 months of active life."

C. bellottii is found in the Buenos Aires Province and southwards to the Mar del Plata (38 degrees Southern latitude) and in the southern districts of the provinces of Entre Rios and Santa Fe. In southern Uruguay and in the province Salta and in Paraguay, the pools are without any vegetation in the water, but with plenty of grasses around the edges. The bottom is colloid mud and clay. The "bellottii" also may be found in slow current and in rivers (???). In the Rio de la Plata it is said to be rare. pH of the different waters were from 6.9 to 8.0. This species is said to withstand temperatures from 0 C to 30 C or even more. Below 15 C the males take on reddish white color. 30 specimens of this fish were found in a small pool, only 1 meter in diameter and only 20 cm deep. Here it lived together with the much bigger *C. holmbergi*. Two specimens of "bellottii" were taken in a pool only 15 cm in diameter. In a park in Buenos Aires a small pond was inspected in Dec. At this time it was drying up. Only a few, very weak fishes were seen. In Jan. the rain came sooner than usual and 10-12 Jan. the pond had normal water-level. On 7 Feb. it was surprising to find lots of small *C. bellottii* of size 15-20 mm and young fishes of another species which were 5-7 cm long. The intestine was inspected, but no trace of cannibal activities was found, although the intestine was short, which point in the direction of a fish that feeds on live food and not on algae and plants. The water of the pond was slightly acid shortly after the first rain. But later on the hardness and pH increased pH then reaching 8.0. The temperature in the pools in full sunshine was above 35 C, but the fishes did not suffer from that. In nature they are often attacked by *Ichthyophthirius* ("white spots"). A female which was 65 mm long had 200 eggs in the oviduct.

About *C. adloffii* we only know that the ponds where this species is taken perhaps dry out during the dry season. Also that there are plenty of plants in the water and at the surface. It is caught together with *C. wolterstorffi* which is rarer. Together with these two species, also *C. Cp. melanotaenia* is taken. German aquarists had fry of *C. adloffii* without any drying up of eggs and the fry came shortly after spawning.

Within the genus *Cynolebias* great differences between the sexes are found. At least in the "real" *Cynolebias* also the number of rays in the fins are not the same in males as in females. This unique

difference between the sexes misled Steindachner to describe the female "bellottii" as a distinct species named "maculatus". Great differences between the sexes seem to be most common in fishes which live in small waters and may be of importance for these fishes (?). The species are not considered to be very peaceful at all. The mature males fight each other and often they cannot be kept together, but they do not occupy a certain territory. Also they often chase the poor (and smaller) females all day long and also often the females are killed. This unpeaceful behavior very often increases through the whole life of the males. Cynolebias are not easy fishes to keep in the common aquarium with alkaline water, great hardness and no humus or rock-salt in the water. The skin often is attacked by bacteria and/or fungus and the poor fishes soon will die. Adding of one (level or top) teaspoon of sodium-chloride (common, coarse rock-salt) to each 10-15 liters of water very often will help these fishes. Much better, but not in accordance with the natural conditions, is the use of soft water of low hardness and salinity; this together with peat-filters or bottom-peat will help you in keeping your Cynolebias alive for several months. But we need more information about the natural conditions and in particular the composition of the bottom mud, in my opinion the aquarium keeping of these most handsome and interesting fishes by far is not safe enough. The same could be said about the African counterpart, the Nothobranchius, which seems to live under the same ecological conditions and which still is a problem in the aquarium keeping.

Our friends in East Africa and Uruguay could render us a great favor if they could give us more ecological information on these most interesting genera. All aquarium-bred species show a very fast development until maturity, which may be reached after 4-6 weeks on heavy feeding, but then the fishes by far have not reached their sizes as adults. As soon as the fish begin to breed, the speed of growth decreases very much and from then on they seem to grow slowly during the rest of their life. After maturity, in particular in the stock of "nigripinnis" I keep, the fish often shows weakness from lack of food. Even a few days without a good supply on live foods seems to hurt them, in particular the females. This may be caused by certain internal diseases such as tuberculosis or ichthyophonous, but maybe the poor fish breaks down his (hers) own tissues in order to keep the production of eggs and sperm level. But after all, the life of this sort of fish normally should be rather short, and only few specimens reach the age of one year. Although in "ladigesi" as well as in "nigripinnis", I as well as others have had specimens in good state after 1 1/2 years of life. Low temperature and moderate feeding seems to increase the lifespan very much, in particular in specimens which are not used in breeding.

My "nigripinnis" never took prepared food. But first "whitei", later "bellottii" (Guevara's stock) took lots of prepared food of the "flakes-type". The "ladigesi" also do not like dry food, but in broods there are always some, which get used of it and live quite well on it; if also live food regularly is supplied. I have tried to give dry food to my young "melantoaenia", but they did not take it, even when they were very hungry.

In the real Cynolebias, the spawning act takes place deep into the mud of the aquarium and the pair disappears from our eyes. The male chooses the place for spawning and the ripe female follows him in his dive into the soft mud. Very characteristic is the very strong spawning instinct of the male when he sees a female. The pair spawns even in transportation cans a few minutes after they have been put into the can. It is not very easy to break the spawning once it has started. This very strong spawning instinct we also find in the Nothobranchius and in some ways in most Aphyosemion. This makes breeding very easy indeed. Also the Pterolebias often spawn in cans and glasses in which they are transported. They then

place their eggs on the bare bottom. Foersch found that "bellotti" preferred sand over a bare glass-bottom, soft bottoms before a hard bottoms and a dark bottom before a light one. Only with "whitei" does the female place her head behind the pectoral fin of the male and his body. In "ladigesi" as well as in "melanotaenia" the males do not dive into the mud. Eggs mostly are spawned at the surface of the mud, just like in the "gulare-group" in *Aphyosemion*. Also in behaviour ("ladigesi") they remind us of the *Aphyosemion*.

Foersch studied the development of eggs "bellottii". These studies have been of the greatest importance to other breeders of the "annual fishes". He found that development did not start in eggs at once after spawning. Only after 6-7 weeks -quicker at higher temperatures, slower at lower temperatures- at room temperature the fry could be seen in eggs.

Here are some data of my own.

Guevaras stock of "bellottii", which came in on 20 Dec. 58 as eggs, gave the first few eggs on 15 Feb. 59.

- From the spawning of one male and two females I had 18 eggs. 13 got fungus.
- On 24 Mar. 59 there was a big embryo in 4 of the 5 eggs left.
- On 30 Mar. 59 they were near the "hatching point". Kept at 23-26 C.
- From 09 to 16 Feb. 58 one pair of "nigripinnis" spawned 60 eggs. Washed out on 16 Feb. 58 and placed without mud on shallow water.
- 13 Mar. 58 I could find an embryo in some of the eggs.
- On 04 Apr. one fry hatched out without help. "Belly-slider", of course.
- On 22 Apr. 58 more 4 fry hatched by themselves. Also "belly-sliders". Also 23-26 C (23 at night and 26 during daytime, caused by the lighting of the "locker" in which I keep eggs in glasses as well as 10 aquaria.)

Foersch found that eggs placed under the same conditions, with only different temperatures gave the same percentage of resting eggs within 6-7 weeks. Eggs which do not develop an embryo within these 6-7 weeks he called "resting eggs". Eggs which have started their development of an embryo will hold a hatchable fry after 2-3 weeks independent how long they have been dormant as resting eggs. (Foersch) Foersch had several resting eggs examined under the microscope and in no egg any trace of development was seen. He observed development (until hatchable fry) in eggs which had been dormant for 1 1/2 year (these eggs had been kept cold for some time). Eggs which had been stored at room-temperature showed development after a dormant life of 9 months. Eggs which had been stored rather dry in peat-moss for 2 months gave not quite 50% of the total amount of eggs in peat as fry when hatched in water after that time. Also eggs which have been kept in water at room-temperature gave a little more than 65% of resting eggs after 6-7 weeks.

By Foersch 285 eggs that after drying of 2 months still were transparent, gave after another drying of 6 1/2 months 163 fry.

Dr. Foersch studied the percentage of resting eggs in *C. bellotti* depending on the conditions under which he stored the eggs after spawning. He found that the earlier he started the drying up of the peat, the more eggs had developed an embryo after a certain period of time. These experiments were made at 19-23 C and included about 900 eggs total. Eggs in each spawning were divided in two equal portions. One half

was dried at once and gave after 7 weeks fry from about 50% of the amount of eggs. The other half amount of eggs were kept moist during the same period and after 7 weeks only 21% of eggs had hatchable embryos.

Here are the data of some of my own spawnings:

Cynolebias (*Cynopoecilus*) *ladigesii*. Spawning until 08 Apr. 1957. Dried at once.

- First watering 17 May 57: 64 fry hatched. Second drying on 25 June 57.
- Second watering on 13 Mar. 58 (total more than 340 days since spawning): 47 fry plus 10 belly-sliders. Third drying on 17 Mar. 58.
- Third watering on 17 May 58: 5 normal fry and some belly-sliders (total 374 days or more since spawning). Stored in big plastic box, airtight with a stem of *Ludwigia* as oxygen-producing plant. Peat very dry.
- Same species: spawning 28 Jul. to 09 Aug. 1956. (4 males and 4 females). Eggs on shallow water from 09 Aug. to 15 Aug. with little coarse peat. Dry on 15 Aug. (evaporation, slowly).
- First watering on 29 Sep. 56: 36 fry. Second drying quick on 07 Oct. 56.
- Second watering on 17 Nov. 56: 12 fry. Not redried.