
The Scheel Letters, No. 36

The Genus Procatopus

The little known West African genus of "lampeyes", the Procatopus, was proposed by Boulenger in 1904, with "nototaenia" from Cameroon as the typical form. As since 09 Aug. 57, I have kept and bred "gracilis" from western Nigeria. Since the Danish zoologist Stenholt Clausen has recently published a description of 2 new subgenera and 6 new species in Procatopus (see H. Stenholt Clausen in Vedensk. Medd. fra Dansk Naturh. Foren vol 121/59), I am now able to give you some information on this rather interesting genus.

Myers placed Procatopus as type for the subfamily Procatopodinae (formerly known as the tribus Aplocheilichthinii) or "lampeyes" and next to the genus Hypsopanchax. Hypsopanchax have not yet been imported, but are very deep-bodied killies which in some way remind you of the "hatchet fish". The best known genus in this subfamily is Micropanchax, also known as Aplocheilichthys. The known species (10) in Procatopus differ rather much from the forms of Micropanchax that have been imported. Procatopus are bigger and are more deep-bodied, but first of all, some of the branchiostegal rays are prolonged in the male and form something like a "thorn" to be seen behind the lower part of the gill cover.

Clausen divided Procatopus in 2 subgenera:

> **Procatopus (Procatopus)** contains 3 species that possibly display a lower metallic glean or brilliance, no produced rays in the caudal fin (of the males), and pelvic fins nearly below pectorals. Species live only in typical rainforest country mostly near the coast of the innermost corner of the Gulf of Guinea.
>
> *P. (P) nototaenia* (Boulenger 1904) Lagos to French Cameroon, along coast
> *P. (P) similis* (Ahl 1927) 51 mm Kumba etc. in Southern Brit. Cameroon
> *P. (P) abbreviatus* (Pellegrin 1929) near Douala in French Cameroon
> *P. (P) glaucicaudis* (Clausen 1959) 58 miles north of Kumba
> None of these species have been imported yet and possibly they are not suited for aquarium, since they live under extreme rainforest conditions and also have less brilliance compared with the species in the second subgenus.

Procatopus (Andreasenius) has 6 species. In these the metallic brilliance is more pronounced, upper and/or lower rays of the caudal fin of the males may be produced forming a small "sword" or streamer. Pelvic fins are inserted, not below, but behind the pectorals, but not as far back as found in most Micropanchax. These species seem to live more inland and thus under conditions that possibly might be copied more easily in aquaria. Northern regions of the Cameroon lowland high forest, rainforest with a somewhat lower rainfall. None are found east or south of the Mamfe district. The western limit may be a line from Abeokuta-Ilorin-Jebba bridge (on the Niger).

P. (A) aberrans (Ahl 1927) Cameroon (Ossidinge) 45 mm
P. (A) roseipinnis (C. 1959) Mamfe, British Cameroon
P. (A) nigromarginatus (C. 1959) 27 miles west of Mamfe
P. (A) plumosus (C. 1959) Ikon-Mamfe road, 3-4 miles from Ikon
P. (A) gracilis (C. 1959) large area, west and south of Niger, east of Ilorin

P. (A) andreaseni (C. 1959) Owe River, west of Idah on the Niger There is little information on the ecology of the various species. Clausen reports that there are no records of the existence of any species of Procatopus occurring in stagnant water, except that some of the savanna streams inhabited by "gracilis" may be temporarily transformed into a series of stagnant pools at the height of the dry season. Large numbers of Procatopus die under such conditions. Normally Procatopus are found in running water, preferring the faster parts of the stream, though rarely in strongly turbulent currents (except "andreaseni"). Except for similis" and "andreaseni", all species seem to prefer small or medium size streams to large rivers, though this impression may be due to the greater ease with which they are observed and captured in smaller streams.

All species are gregarious, forming shoals at a short distance below the surface, constantly swimming with a characteristic "fluttering" movement and waving fins, but only progressing slowly against the current. The males often are seen performing "dances" or staging mock fights. All species will frequently snap insects, but they are not surface dwellers to the same extend as other Aplocheilichtini such as Micropanchax. Submerged aquatic vegetation is generally scarce in West African waters, and this is true in the habitats of Procatopus. Occasionally one may find clear, fast-moving low conductivity streams containing "carpets" of Eichhornia natans, Heteranthera, Potamogeton or Commelia sp., while Ottelia ulvifolia may form growths in the clayish, rather turbid and usually slower savanna streams. Most streams, however, have no truly aquatic submerged vegetation but grasses, herbs and shrubs often dip into the water from the banks, offering fish spawning sites and the fry some measure of protection. In the forest rivers of Cameroon (clear, extremely low conductivity) the only reasonably common submerged aquatic vegetation seems to consist of dark green ferns with a wooden rhizome and crampon like rootlets for attachment, growing on bare rock surfaces and sometimes covering these, but even these ferns are only occasionally seen. Fry of Procatopus are usually found in quiet banks among the vegetation (submerged or dipping into the water), near the surface. But even when quite young they leave the shelter and join the shoals midstream, hence these contain both adults, semiadults, and very young juvenile specimens. Clausen claims a certain degree of a parallelism between Procatopus (especially the subgenus

P. (A)) and South American Poecilinae of the Xiphophorus group. Not only in shape and coloration, but also in behavior... this similarity is a further development of a parallelism already existing between Poecilinae and Aplocheilichthyini... For the various species: "glaucicaudis" was found in a small, rather fast-flowing stream in hilly rainforest. The stream belongs to the Upper Cross River system. Many fallen tree trunks were in the stream. Trees in the surrounding forest had an abundance of epiphytes (mosses, ferns, Monstera, orchids) indicating a very high rainfall. Males are much larger than females. About 45 mm total length (standard length 38 mm). The body lacks most of the metallic luster so characteristic for the genus (subgenus?), instead, it has an equally beautiful silk like sheen. This is one of the characters in which it resembles "similis". Dorsal and anal are delicately flesh colored with an orange or yellowish tinge. The edge is conspicuously darker, deep salmon or flesh colored border. Anal has a pattern of dark orange spots. Caudal fin is a smoky bluish gray. Clausen kept a small shoal in an aquarium at Ibadan. The male, on meeting a female or a rival male, will show a display reaction, spreading the dorsal and anal fins (but not the caudal) and performing a peculiar "wriggling" movement on the spot, almost like a fish that has "caught a cold". It has a certain resemblance to the display seen in P. (P) nototaenia from Cameroon.

"roseipinnis" was found in a stream in the Lowland High Forest in hilly country. The water was clear, but the sandy banks exuded a strong smell of ammonia (cattle urine). Conductivity was 14 (this is the upper limit of "distilled water" in the USA). Also found in a similar stream with clear water, sandy bottom and many submerged ferns on dead tree trunks, no smell of ammonia, conductivity 8 (reciprocal megohms/cm) and in a small stream in the western outskirts of the Mamfe township, in turbid and highly contaminated water (sewage etc.): conductivity 25, i.e. exceptionally high for the Cameroon Lowlands. About 50 mm total length. Female smaller. No produced rays in the caudal fin. Color: the impression is that the whole animal is rose colored, especially when viewed against light, or on a light background. Noticeably the caudal peduncle and the posterior half of the body have a strong metallic blue or bluish green luster.

"nigromarginatus" was found in a small stream in the Cameroon Lowland High Forest in the Upper Middle Cross River system. Benches of sandstone appear in the stream itself and at the banks (highly eroded, with potholes), possibly all submerged during the rainy season. Aquatic Araceae grows with sucker like roots attached to the rock. Medium current (probably stronger during rains). The bottom is mostly sandy or muddy. The water is dark-colored but fairly clear, conductivity 8 1/2... Total length about 50 mm. Closely related to "roseipinnis", but more robust and generally larger. Males have a strong metallic greenish blue or bluish green luster, less brilliant in the anterior portion. Eyes reflects light but less strongly than in "roseipinnis". Vertical fins are faintly tinged with a pinkish rosy hue, mostly in the caudal fin that is strongly marbled with reddish orange. These fins have a thin but very striking external border of velvet black, particularly well developed in the caudal. In the dorsal and anal there is an additional or internal border of dark orange.

"poumosis" was taken in a small stream in the Middle Cross River region, in a rainforest only a few miles from the boundary between the Cameroon Lowland High Forest and the derived savanna. The bottom was sandy and muddy. Conductivity 10. Medium current. Water fairly clear... Less than 4 1/2 cm total length (male, female smaller). In this species the rays are mostly greatly prolonged in the vertical fins and also the pelvics, forming many filaments (as we find also in some Aphyosemion of the

Fundulopanchax group). In the caudal fin only the upper rays (3 in type) produce, forming long filaments... On a light background the entire fish appears golden with a light bluish tinge and with 3 bright orange bands along the lateral midline, and along the dorsal and ventral edges, respectively. These bands continue on the caudal fin, the dorsal and ventral band curving towards the midline of the fin and nearly meeting, forming an arch. The middle band extends posteriorly nearly to the apex of the arch... Dorsal and anal with rows of orange spots, free parts of rays whitish. The entire body has a strong blue luster, against which the orange bands nevertheless stand out clearly. Eye does not reflect light as strongly as in "roseipinnis". Closely related to "aberrans" and "gracilis".

"gracilis" was taken at many places in most districts in Western Nigeria, as well as the southern parts of Northern Nigeria, west and south of the Niger and east of Ilorin: rainforest, derived savanna, southern Guinea Savanna, in smaller and medium sized streams of all types: clear and turbid, fast and slow. The type locality was a small stream at Iperin, a few miles north of Ijebu Ode: rainforest, bottom sandy, water clear, conductivity 40) is exactly on the geological border forming the southern boundary for the distribution of "gracilis" (south of which it is replaced by "nototaenia"). The conductivity of the streams south of the boundary is low, usually less than 30 and often much lower. Waters north of the line gave a higher conductivity, nearly always above 60 and usually much higher, up to 400... Total length about 4 1/2 cm (male, female is smaller)... Dorsal, anal and caudal with rows of small reddish dots, in strongly colored corner often forms a small "sword" which is grayish or blackish, sometimes nearly black (in the present aquarium stock this corner is milky white and only rarely one sees a trace of a streamer). Sides of body reflect light with brilliant metallic, greenish blue or bluish green luster, somewhat paler in anterior region. The eye itself does not reflect light conspicuously. This account applies especially to the type population and the population of adjacent areas (Ijebu and Oyo districts). Males from the Ilife-Ilesha area have a more nearly pure green luster, in this form the lower corner of the caudal fin lacks the milky colour, and is nearly always drawn out into a short rounded lobe... Males can be seen courting females at all times of the year, but juvenile individuals of "gracilis" seem to be most abundant between midsummer and December.

"andreaseni" was taken in the Owe River between Anambra River Crossing and Adoru (near the latter), east of Idah (on Niger), southern part of Northern Nigeria. Tributary to the Anambra River, eastern affluent of Lower Niger. Gallery forest in derived savanna. Current strong turbulent in places (dry season!), water clear, bottom sandy and rocky. Profuse vegetation of Eichhornia natans in less turbulent places. Conductivity 7.5. On cretacious sediments... About 40 mm. The difference between male and female not as pronounced as in the other species. Also this one is a rather slender fish, recalling the shape of the various Micropanchax... Fins colorless, without patterns. Eye reflects light. Body and caudal peduncle reflect light with metallic blue green luster, paler in anterior portion of body.

The present aquarium stock belongs to the Ilife-Ilesha population (however in all males of my stock the lower corner of the caudal fin is clearly whitish milky). The stock was caught by the zoologist Birket-Smith in a small stream on the road from Ibadan via Ife to Akure, just at the point where another road turns in from Kabba via Ifaki. 6-7 males and one female plus one juvenile were brought to Copenhagen and placed at the Public Aquarium at Charlottenlund. The inspector of the Aquarium, Fr. G. Mandahl-Barth, offered me 2 males, the female and the young for breeding experiments, together with 2 forms of Aphyosemion (from Akure, near the collecting place of "gracilis") that now is known as "calliurum

calliurum" and "calliurum ahli". As the stock lived at the Aquarium in water of conductivity of about 1500 recp. m. I had to dilute the water slowly to my normal conductivity (at that time) of 20-30 recp. m. This was done in the usual way by diluting the water in the tank each 24 hours with an equal amount of aerated demineralized water. However, the fish did not like the low conductivity water. They took on a certain white color all over the head. I added common salt (NaCl) until the conductivity reached about 500 recp. m. The offspring live at 200 recp. m. without any salt added. They also were able to live in aged tapwater (15 dH, 500-600 recp. m.). The fish were extremely shy and hurt themselves swimming against the glass and I had to keep them at dimly lit even during the night. In 15-25 liter tanks the males fought severely and I had to separate them. Males also chased females but did not hurt them severely. I kept the stock in the usual "rainforest tanks" with many plants. They liked to swim in the free water and only took cover among plants when scared. I wonder if this species will ever learn to live in full glass tanks, whereas they liked frame tanks. They soon learned to take dry food ("flakes") and liked it very much. The young one grew up to be a female, from which possibly the whole offspring came. This fish liked to swim all day long, forming a small shoal of its own. In frame tanks they rather soon became tame and went to the surface during feedings. They liked fruit flies very much and the surface was "boiling" when one dropped a lot of flies in the tank.

Clausen, as well as Birket-Smith, praised the brilliance of this fish, however the brilliance is not at all glaring, although very pretty indeed. I kept the species at the normal 18-22 C of my different tanks that normally have no particular heating. At higher temperatures the brilliance is much better. However, Birket-Smith, in a letter, told me that during another trip to Cameroon he discovered that the fish were more brilliant when the water they lived in was more aerated. This also proved to be right in tanks. In particular, when blowing the tanks with pure carbon dioxide, giving strong artificial light (and thus increasing the oxygen concentration of the water far above the "normal" aquarium values) the males took on their best brilliance independently of the somewhat low temperature (21 C). Metallic brilliance normally is nearly pure green when seen under normal aquarium lighting. However, if some of the light comes from below or right in the cast changes into blue or even a most handsome violet.

From 09 Aug. 57 and until 08 Jan. 58, I did not find any egg or fry. Then nearly every day there were one or a few fry at the surface every morning. One male and 2 females lived in a 25 liter tank, heavily planted with ferns and Cryptocorynes. Most eggs were spawned into the roots of Cryptocorynes or into the filamentous peatmoss. Only very few were found in the center or on the roots of the floating ferns (Ceratopteris). Eggs are very large, measuring about 1.6 mm, transparent, with long slimy filaments on one pole, membrane finely dotted - just like eggs of Micropanchax. Fry also are just like fry of Micropanchax ("macrophthalmus", "loati", "pelagicus", and "pumilus"). They are very slender, swimming near the surface with eel like movements, very dark, nearly black (which comes from a black stripe along the back). Shining eyes.

Fry of "lampeyes" differs very much from fry of species within the subfamily Rivulinae, but not so much from Oryzias, not only in shape and color, but also in behavior. Eggs hatch within about 2 weeks, but "resting fry" seems to occur very often, as in "macrophthalmus" when bred in alkaline tapwater. However, this water was slightly acetic (pH 6.2-6.6). A few fry did hatch with a big yolk sack, in particular when the adults were fed with dry food. Fry measured 6.2-6-3 mm just after hatching. They grew just as slow as other "lampeyes" do. After about 6 months only a few were above 25 mm. They

caught Oodinium very easily and I found a "new" cure to use on small fry. The tank was placed under strong artificial light day and night in order to remove any waste product by plants (I did not know of "blowing carbon dioxide" at that time). This made the Oodinium increase in number, but as Oodinium needs rather long time to kill even a small fry, only a few died. After one week the Oodinium was decreasing and after about 2 weeks there was not any Oodinium to spot. Also adults now and then were attacked by Oodinium, but only in dirty tanks. They recover easily in cleaner water without any other treatment. As the fish would not spawn in small (unplanted) tanks on nylon, I had to remove the breeding team from the tank into another every 2 weeks. By that way I soon had about 100 fry. 50-60 of these grew up, but some -mostly females- died. As the species was undescribed at that time, I had to wait for rather long time -waiting for the description- before I could deliver specimens to other aquarists. Most, if not all, of the females that went out to aquarists here were killed by males or by disease. None were bred. The sole pairs that possibly live now is one pair here and one at Klementsen. They are more than 2 years old, but still very sound. One female still lives in Philadelphia, also 2 years old (Jack Scheidnass) under severe conditions. This handsome little species needs to have another chance before the last female dies. So come on Klementsen (and I). However, no species of this genus possibly will become popular aquarium fish because they grow much too slowly and are too feeble under "normal" aquarium conditions.