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- 3. Mouthbrooding fighting fish of Peninsular Malaysia 1
- 14. Hillstream Bettas

Front cover: *Betta kuheniae* by Jens Kuehne

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MOUTH-BROODING FIGHTING FISH FROM THE PENINSULA OF MALAYSIA PART 1

Jens Kuehne

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B. ferox Than Pliu male and female both showing their smoky dark colors

"Exploring is harder than discovering"- James Cook

To date, the distribution of most tropical freshwater fish is well known only at certain locations, as is the case with many other organisms. After I had passed the phase of selective collection in southern Thailand, it became more and more necessary to explore and document the distribution and borders of the mouth-brooding fighting fish *Betta pugnax*. That new forms, and perhaps even new species, would be found here was almost inevitable and evolutionary processes in the context of geographical changes could be clarified.

Many miles were travelled, mainly by motorcycle. Southern Thailand was examined more thoroughly and then the north of Malaysia moved into the spotlight. Many a time it was difficult, especially in the rainy months.

The *Betta pugnax* group is known from the peninsula of Malaysia, from the political state of Malaysia itself, and as far as southern Thailand. The type-locality of *B. pugnax* Cantor in 1850 was on the west coast of Malaysia in Penang. Around the high mountains along the Malaysian border, fish from this group were collected. In the political state of Thailand, fish from this group were collected from the provinces of Narathiwat and Patani, and although they are said to come from the provinces of Satun Songklaa, they probably do not. To date, only a few sites have been investigated and when this was done, these animals often turned out to be a new species. So *B. stigmosa* came from the east coast of peninsular Malaysia, as did the species described by Schindler & Schmidt; *B. ferox* and *B. apollon* SCHINDLER B. & SCHMIDT, 2006 to do so.

The same may also be true for species such as *B. pulchra*, which belongs to the

B.fusca group, but has been known only from the south of the Malaysian peninsula. It is likely that this species probably also occurs in the north, as there are quite similar members of the *B.pugnax* group but no-one has knowledge of that to date. More of that later.

And in the *B. picta* group we hear about the better-known as fighting fish as *B.edithae*, *B. picta* and *B. simplex*. But with improved observation and investigation, new species such as *Betta pallida* Schindler & Schmidt, described in 2006, known earlier as *B. prima* from southern Thailand. Consideration of range of the species has given this author only headaches - even more on that later.



Many rivers in South Thailand have high mineral content, habitat for *B.ferox* and *B.pallida*

The main viewing areas ...

... with regard to the distribution of mouth-breeding fighting fish must always depend on the mountains, as they represent both a barrier and a means of dissemination.

All labyrinths probably do not exceed 800m above sea level in the mountains. In contrast, the mouth brooding

fighting fish of all groups need a narrow strip to spread, no more than 20 km from the mountain base. Only within this geological strip, can the mouth-breeders spread along the mountains. It seems that each type of group of fish tolerate only a certain range in terms of flow velocity and oxygen content. Considering this context, each type has only one area of suitable habitat, however, along the entire mountain base of only 5 to 10 km are available, calculated from the mountains to the alluvial plains.

The next consideration focused on geophysical and climatic changes that occurred in the past geological eras, and so found their way into the deliberations on the spread of these fish groups. For example, the sea level changes often in the last 100 000 years but the last ice age is only 10,000 years ago.

The studied areas in Peninsular Malaysia, especially in southern Thailand

The Khao Luang – Bantat mountain chain runs through Malaysia, southern Thailand from north to south across southern Thailand and is extremely relevant to the distribution of the mouth-brooding fighting fish of this region. This mountain range has to be divided into three regions.

The Khao Luang mountains, which have their utmost expansion in the north on the island of Ko Samui are limited to south of the town of Tung Song. At the same time, the Khao Luang – mountain range has the Khao Luang mountain (1800m), the highest peak in southern

Thailand. This mountain range is an insurmountable barrier for labyrinth fish on the mainland. Only a small strip at Kanom Beach - opposite a famous tourist resort on the mainland side of Ko Samui - near the lake, but still within the country, could constitute a "bottleneck" in spread through the mountains from east to west - or vice versa.

From Tung Song to about Rattaphum in the east and Langhu in the west, the Banthat range stretches with mountains extending from just over 1000 m above sea level. Here I consider there may be two options for fighting fish to cross the mountain range. Not far from Tung Song, two passes, just a little over 100 m above sea level, cross the mountains which are naturally used for roads. Otherwise, the mountain is too high for the fighting fish. Only when you come to Rattaphum do the mountains run from the real Banthat range where they form again a relatively wide corridor for distribution, before the mountains in the third part, the Chinmountains - named after Mount Chin. The Chin mountains are a smaller range, but no less high, that continues their run in Ko Tarutao Archipelago, which includes the famous holiday island of Langkawi. And this is the actual the distribution range of *B. ferox*.



The plains of Lan Saga, home to *B.ferox*, *B. sp. aff. apollon*, *B. sp. aff. Lehi* and *B. Pallida*. In the background o Khao Luang at 1883 m

The next priority consideration ...

... were the Tanao Si mountains - the northern mountain range, extending from Malaysia, which pushes its way to southern Thailand. Here the eastern and western flanks, this time also in Malaysia, were researched. I looked for some 'old friends' but also for new discoveries. On the west coast, my investigations came to to Kuala (Malay for City) Nerang and Tasik (Malay for lake) Pedu. On this mountain slope, we find, pretty consistently, mouth-brooding fighting fish, possibly *B. ferox* or *B. pugnax* itself. Not immediately adjacent, but further south, lie the mountains around the town of Ipoh. Here again we find mouth brooding fighting fish, probably from the *B. fusca* group.

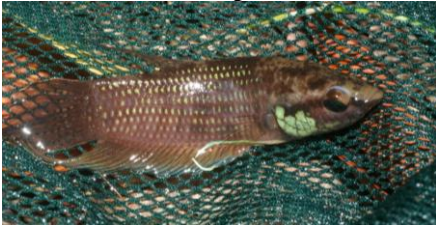
In the East, I visited the provinces of Pattani, Yala, Narathiwat and lying on the Malaysian side, Pasir Mas, Tanah Merah, and further south in Terengganu the Sekayu waterfalls, which was new for me.

The wide corridor at the border crossing, Sadao is probably very

important for the spread of the mouth-brooding fighting fish. You may also see a dividing line here. The mountain ranges of Chin and Tsi Tao rise here, but far apart. It would also quite possible that *B. pallida* has spread on the west coast of Malaysia to the south but this remains speculation for now. And it is very interesting, that I found here various *B. pugnax* forms - in the most northern foothills of the mountains in the province of Si Tanao Songklaa at Hat Yai, which exist only as discontinuous hills.

I leave aside the, much more northerly, extension of the Tenasserim mountain range, ie the provinces of Ranong and Pang Gna, because even after several attempts, no mouth-brooding fighting fish could be found here !

The *Betta ferox* complex

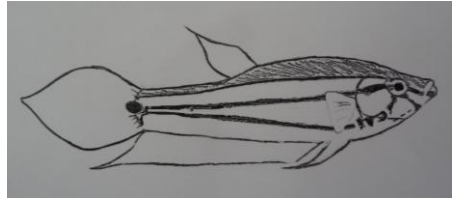


Full-grown *B. ferox* male from the type locality at Bori Pat in southern Thailand

The relatively newly-described *B. ferox* has as its center of distribution, its type-locality, the almost legendary Boripat waterfall in the Chin mountains.

To understand the following a bit better, I will add at this point some visual recognition features for which I have distinguished the fish. The face masks were always compared in their dash-dot

arrangement, as was the course of the third shoulder stripe. All *B. ferox* have a relatively equal second Postorbital stripe, and the 3rd stripe on the body goes directly to the tail spot (See Fig.)



Line drawing of *B. Ferox* from the type locality, the where the third side stripes meets the second on the tail spot.

As my main focus I will directly address these features, encouraged by previous catches and suspected discrepancies. So you can see that the distinctions from all the areas and even in different habitats are not so strong but are still noticeably different. First I came to the conclusion that this phenomenon changes from south to north according to a rule in such a way that in the southern animals (Tasik Pedu, Thale Ban National Park, Boripat to Than Pliu Waterfall and Khao Ron in Trang) where the three side stripes lead directly to the tail spot. The northerly populations changed the meeting place of the third shoulder stripe to the second (stripe). In almost every valley the meeting moved forward to the chest. This phenomenon probably was only seen in the Banthat range and Khao Luange mountains. I had to modify this theory, as in the area south of Hat Yai and also in the southern part of the province of Yala, I was able to later identify new sites where I had caught fish, which again showed the pattern in which the 3rd stripe hits the second

quite far forward. These highlands are already influenced by the east, which means they are more likely to represent the eastern edges of the mountains that run through Malaysia.

The fact is that hard or soft water makes no difference to *B.ferox*. Due to the geological features in southern Thailand, this species is forced to live in both habitats. An example is again the Boripat, with absolutely low mineral water, but 5 km away, in a river of the same river system, is hard water and contains ... of course the same type as *B.ferox*. The hard water Betta from Than Pliu / Langhu is also probably a *B.ferox*!

Against these observations one must only say that, in the Khao Luang mountain range one example of a *ferox* type occurs in many different habitats that is absolutely consistent in the face mask and shoulder pattern (the biotopes around the entire Khao Luange mountain chain). These habitats are only soft water and *B.sp* *afin ferox* are only found there, although apparently suitable hard-water habitats occur in the area. These fish also are strikingly similar to *B.akarensis*, although the group is currently just known from north of Borneo and its offshore islands. Maybe we are dealing here with the related *B.apollon*, of which I have unfortunately never seen photos or drawings showing the lateral stripes.



The Pliu Than waterfall in the rainy season, these water masses, only the species *B.ferox* on the west coast and *B. sp. aff. apollon* on the east coast of southern Thailand can withstand for a short time. At Than Pliu lives an interesting population of *B.ferox*, with an attractive smoky throat area. Like *B. simplex* they are real hard-water fish.

A mistake was to think that the mountain range that runs through southern Thailand, form an insurmountable obstacle. In fact, they are "full of holes like Swiss cheese," The distribution of *B.ferox* just for example, "climbs" well in the mountains. I think it is only due to the peculiar geology of southern Thailand that these fish are not found higher in the mountains than 500 to 600 m. This is not because of the height as such, but the flow rates of the streams in the rainy season. Because the mountains in southern Thailand are relatively small, flow increases accordingly and washes away everything in the rainy season. Nevertheless, there are obvious "holes", as already mentioned, in Tung Song, where the actual Banthat range hit the Khao Luang and the area where the Banthat range meets the Chin mountains.

An excellent example of crossing a mountain range is provided by fish from Thale Ban National Park, whose

distribution continues through a narrow mountain valley in Taman (National Park) Negeri. Only at the border crossing near Prachan Wan is there a certain altitude increase of the area to just over 100 m above sea level. But *B.ferox* is found on both sides of the border crossing. I now think that I have also found that the fish of Langkawi represent *B.ferox*. Since, as mentioned above, the Chin mountains and the island archipelago of Ko Tarutao, including Langkawi, should be considered together. Thinking in terms of political boundaries made me doubt before, but Penang is another island, its own archipelago and hence not related to the island archipelago of Ko Tarutao.

The mouth-breeders that differ the most

A mouthbrooding fighting fish that I found in the central part of the Banthat range on the west flank in Radsada we will ascribe to the *B. pugnax* group for ease of understanding, differs in pattern from *B.ferox* relatives, and could be a good new species. The captured specimens were never greater than 6 cm and a few males already had eggs in their mouths. I call these animals here *B.sp. aff.ferox* 'Radsada'.

These animals have a lower chin strip and a second post-orbital stripe, chin, and this stripe is a different pattern from that of *B.ferox*. The third side strip runs, just as in *B.ferox*, straight to the tail spot. In coloring, these fish have a more intense red around the eyes than other members of the *B. pugnax* group. The many scales shine very much, just as in this fish. In addition, these animals have

the added feature of ladder fins, as I previously only saw in *B.akarensis*. All in all, these fish are similar to *B.ferox*, but the differences are already striking. The habitat of this pretty little mouth breeder is located in the limestone region, therefore leading mineral-rich water, sometimes up to 15 ° kH! Unfortunately, I found these animals, even after intense efforts, only in a tiny area. Thus, this fish at the moment is classified as high-risk. I hope my article will interest hobbyists sufficiently to find these mouth-breeders and maintain and breed them for a long time.



B. ferox from Radsada / central south Thailand showing the ladder in the tail fin well.

The second find has been known as sp. "Satun" in IGL circles and has now been described as *B. kuehnei* SCHINDLER & Schmidt (2008). For a long time we thought about whether this mouth-brooder is attributable to the *B. pugnax* group at all. But the doubt has been eliminated, although its shape and color departs from most other members of the *B. pugnax* - group. I make the suggestion that fish should be given the name "blue throat".

This mouth-breeder is characterized by a squat body. It is also smaller than most

fish of this group, although I have come across animals bred in aquariums that are extremely massive. This is normal, because mouth brooding fighting fish always grow bigger in aquarium culture. So by the age of three to fish can get like this like this which can hardly ever occur in nature. Probably this is due to lack of various stress factors such as predation pressure, etc.

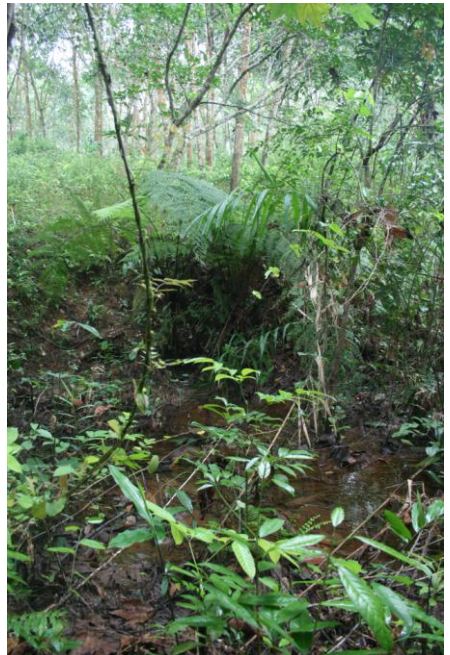


B. kuehnei in the net

But back to the fish itself: In colour pattern, this fish is a feast for the eyes, as two different colors on the head and are distributed simultaneously over a large area. First, a blue coloration in the throat region and second, a green sheen of the gills. It shows the blue throat colours almost always, even in stressful situations such as occur when catching the fish. Furthermore, these fish have a brilliant gloss on the scales of the body. In addition, the anal and the lower half of the tail fin on the edge are a beautiful blue, as we know from the example *B.taeniata*.

To top it all, the tail fin in adult animals seems powdered with a golden bronze. Again, this is, to my view, a common feature of the *B. pugnax* group and their closest relatives, which is shown more or less often, depending on lighting situations. The body markings are as in

the other fish in the group but the absence of the second chin strip and second postorbital stripe are striking. In addition, the third side stripe combines with the second very quickly, behind the chest to jointly run to the tail spot. The most striking deviation from members of the group *B. pugnax*, however is that the tail fin is rounded. All previous mouth-brooders of the *B. pugnax* form known to me have lanceolate solid tail fins. Round caudal fins are more typical of the *B. picta*-group (which also has a representative in Thailand, namely *B. simplex*.). Only the middle rays of the tail fin, which are slightly longer than the fin membranes hint at this in a rudimentary fashion..



Clear water swamp-habitat of *B.kuehnei*

"Blue throat", are known to me only at the border between Malaysia and Thailand and in Thailand's far south-east. The habitats are quite similar to those of *B.sp. aff. lehi*. They are therefore, no longer the fast-flowing areas of the hills, but the subsequent somewhat reduced flow of the larger streams. They are residents of neutral, mineral-poor waters. They like shallow pools and weedy backwaters. They earn their German name foliage shelter fish ! But further south, such as in Pasir Puteh, in Malaysia's northeast, despite absolutely identical habitat parameters, I could not find this fish.

In my view, the *B. sp.* "Satun" whose name is on the same southern Thai town of Satun in Satun district is actually a population from another locality. These fish are different in various details from the type locality to the fish. Almost certainly these fish are not from the Satun district, located on the west coast of Peninsular Malaysia. I am sure that the capture of these beautiful mouthbrooders will inspire other aquarists, since they even do well in a "community tank".



Spawning *B.kuehnei*

More hard water-*B. ferox*

We return to the subject of mouth brooding fighting fish of the *B. pugnax* group from the calcium formations in the western governorate of Satun and Trang, and perhaps Pattalung also in southern Thailand. This just shows the potential of *B.ferox* to form new populations. To do so one has to look very exactly at specific location variants. That is probably most accurately understood on the basis of the head and body markings. The hard water *B.ferox* from Than Pliu waterfall in the north of the district of Satun, for example, have other throat colors, which must be described as smoky. Perhaps this is an adaptation to the extreme water parameters. Although on the other hand, hard water *B.ferox* occur in the southern administrative district of Satun, and their body markings and colours are not of this form and absolutely identical with the type from the Bori Pat waterfall. Some more northern populations, as in Trang, show differences in the third body stripe.



Along these park-like river banks lives a population of *B.ferox* in which the lower lateral line is different from the type locality. Trang Province / South Thailand

An absolute competitive advantage of

the *B. ferox* over other species of this complex is its adequacy to the extremely different water qualities in southern Thailand and also in Malaysia.

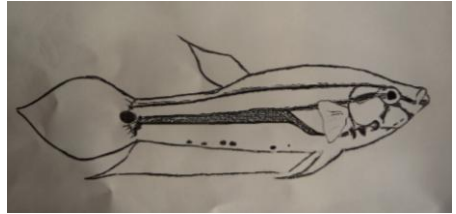
Back to the *B. apollon* complex.



B. sp. aff. apollon Yala, virtually identical to the populations from the Khao Lang mountain

The *B. sp. aff. ferox* from Khao Luangebirge that I 'met again' in the administrative district in the city Songklaa Yai, should constitute a population of *B. appolon*. I refer to certain facts and considerations. The homogeneity in terms of body pattern and habitat, I refer to my previous figure and notes. (?) And the indication is that these populations with the same body markings, always occur in biotopes with mineral-poor water, even though habitable mineral-rich water occurred in the vicinity.

Unfortunately, I've not been to the type locality of *B. appolon* in the district in Narathiwat. But I have been relatively close, on the road to the border town Betong in the administrative district of Yala, where the collections pointed to the above-mentioned rules. So the fish on the eastern flank of the Banthatranges, the river systems which flow to the Gulf of Siam, should wear the name *sp.aff apollon* until further notice.



B. sp. aff. apollon from Khao Luang Mountains, the soft water *ferox*. Here the 3rd Lateral line joins the second just behind the breast

Discussion

Through close monitoring of the sectors and areas, and the habits of animals, patterns have emerged of understanding how these fish occupy niches in the various habitats. It is clear that the mouth brooding fighting fish in Peninsular Malaysia are in evolutionary development. Assuming that it is possible that a species can develop in geologically short time (say 2000 years and below), the division into species within the *B. pugnax* form is almost inevitable.

Furthermore, it is now quite clear how to delineate the distribution area of *B.ferox*. The distribution of this fish starts in the Chin mountains, continues onto the Ko Tarutao archipelago in the north, and then, depending on whether the fish are in the middle Banthatranges, *B. ferox*, continues west and east to the town of Trang and the Banthat ranges, approximately up to the the city of Pattalung, or even almost to the city of Nakhon Si Thammarat. The question is whether the animals caught in Kuala Nerang in Malaysia are *B.ferox*. They are very similar to this, but I suspect rather that they are *B.pugnax* group.

It is fairly certain that representatives of the *B. pugnax* group have 'jumped' into the southern foothills of the Tenasserim mountain range, but failed to penetrate the mountains in the provinces of Phang-Nga, Ranong, Surat Thani and Chumpong. Relatively exhaustive collections on the west flank of these mountains produced no more mouthbrooding fighting fish. But such a "jump" would be considered almost fantastic in terms of the possibilities of the further spread of this group of fish, for here is that the vast plain, through which flows the river wide Ta Pi, so insulating south west of Surat Thani. Newer information, with which I thankfully have been served in this regard, indicates that in geological past, periods of large amounts of precipitation, alternated with periods of drought. In the periods of large rainfall, large masses of soil were transported to the sea, thus eroding whole continental sections. Thus arose and extended, and probably not just once, a salt-water ditch in the area of the great river Tapi in the district of Surat Thani, which reached far into the mainland area inside. These geological processes probably prevented to date the settlement of this group of fish in these territories (where the base of the mountain Tennasserim ranges) north of the Banthat mountain range.

I find the interaction between the populations of the eastern and western mouthbrooders interesting since between the mountain ranges of Peninsular Malaysia are so-called "Gates" which make further distribution of the fish possible.

If it turns out that these delineated areas of distribution represent the actual range borders, then we are able to question in more detail the formation of the individual groups and forms of the mouth-brooding fighting fish again. So then, members of the *B. pugnax*-complex would in fact be the youngest group in the history of development.

Editor's drivel

(Returns by popular demand but not his!) I suppose the theme at the moment must be the meetings season which I'll give proper space to next issue but for the moment you should know that we had possibly the most successful Members' weekend ever with 4 very different talks, a fish show, and auctions for labyrinths and non-labyrinths and all run miraculously to time.

Kevin Webb, Paul Jordan and yours truly also travelled to the IGL equivalent event in Baerenthal, just on the French side of the border. The French share our enthusiasm for fish shows so there was a nice display of Bettas and wild forms. There was also a programme of lectures and workshops preceded by a visit to a local fish importer, while the fish are sold, not by auction but at fixed prices from a row of tables. This can become a little crowded and some delicacies can be overlooked.

These events are our best chance of getting choice new stock but the real benefit must be meeting old and new friends.

HIDDEN HILL STREAMS AND FORGOTTEN FORESTS

2. HILLSTREAM BETTAS

Dave Armitage



We headed for Dungun, fishing a stream on the outskirts where Dennis had found *B.stigmosa*. I thrashed around but found nothing; it's possible that they had been flushed out of hill streams further away. What I did unintentionally collect was a small family of Buffalo leaches, firmly attached to my midriff for which event Dennis obligingly lit up a cigarette, to assist their removal. Suitably swathed in tissues to mop up the copious blood flow, we then tried to find accommodation, only to find all the hotels full because of the public holiday so had to settle for the rather down market 'turtle chalets' which were already apparently occupied by cockroaches but I found that the air con usually got rid of them. Due to the late hour, we had to settle for rather simple moslem food, rice wrapped in an omelette, (and no beer now we were in the heart of Terengganu), while we

watched the kittens playing around the square.

In the morning, we headed out of town before breakfast to revisit the flooded habitat at Rantau Abang beneath an old iron bridge which we fished in 1996. We still failed to find *P.paludicola* but there were *Panchax*, croakers and *Betta imbellis*, several pairs of which were collected. We then cut across to the inland road north to Kuala Terengganu (14) and then turned west on the uphill road to the Sekayu waterfalls. Along the road, I was despatched to explore a pebble-based stream flowing swiftly downhill in a deep, shaded valley. This idyllic habitat couldn't have been a greater contrast to the hot and thorny peat swamp experience and produced the targeted *Betta stigmosa*, including a young male which warranted

photographing by the side of his home stream.

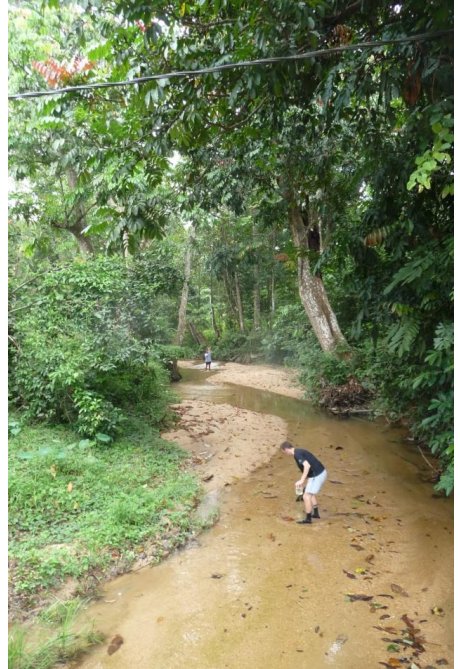


We continued north toward Kota Bharu and just outside Pasir Puteh, we explored another of Dennis's discoveries in the rapidly disappearing light; a wide, sandy stream, flowing quite swiftly and with few hiding places. I had no luck but Dennis, Tony and Paul caught a couple of pairs between them of a compact, round-tailed blue-cheeked mouthbrooding *Betta*, more reminiscent of *B.taeniata* than *B.pugnax* and this was the recently described *B.kuehnei*. We found a small hotel, the Azima, in Kampong Surau, so spared Dennis the ordeal of driving into another busy town. Once again, we chased away the cockroaches with the air-con and, as Paul despite his stoicism, did mention he was not entirely happy with the density of insect residents, I thought it best not to mention the host that I flushed down the drain in the shower. Once again, we had to settle for a simple, alcohol-free moslem meal of Nasi Goreng so had to make do with iced coffee and a quart of freshly-squeezed apple juice.





The following day, after a roti breakfast in Pasir Puteh, we prospected waterfall streams for *Betta kuehnei*. Heading toward Kota Bahru, we turned left at Melor and found a small recreation area by a waterfall. Once again, the stream was broad, shallow and cool with a sandy base. While the others explored downstream, I watched woodpeckers, drongos and a Brown Shrike in the woodland then changed into fishing gear to join the others upstream where we caught reasonable numbers of *B.kuehnei*, along with bimaculata barbs, gobies, loaches and the ubiquitous *Channa gachua*.



We then explored a route via Kadok and Pasir Mas, Tanah Merah and then home for a second night at the Azima, via Machang, exploring yesterday's stream as it passed under a large bridge on the main road, supplementing our collection from this habitat and photographing one of the abundant pipe fish that seemed favour this type of water course.



The next day, we headed toward Gerik via Lake Temengor. We passed a conspicuous limestone outcrop by the side of a large river in the vicinity of Jeli. Here we stopped so Tony could look at some of the Begonias and I noticed a Blue Rock Thrush at the entrance to the caves from which emanated the chittering of hundreds of bats. But we had a long drive and had to forge onwards, stopping for kopi at a roadside coffee shop where we watched migrating swallows and Wreathed Hornbills in the distance. Along the way, Dennis pointed out where the roadside grass had been flattened by elephants crossing the road and when we stopped to prospect a small stream by a logging camp, he pointed out the stool of an elephant calf. It was amusing to see how the logging lorries would park up just before police road checks. (What Dennis referred to as a 'shake down'). Apparently they phone a warning and as long as they are stationary, the law can't touch them ! As we approached the reservoir, we noticed an abundance of bamboo orchids.

We booked into the new Gerik Hotel on the outskirts of town and then were able to set off north on the road to Baling to explore more hill streams, one of which, stony and fast flowing with great banks of *Cryptocoryne*, held another of Dennis's discoveries, a pugnax-like

Betta with plain brown unpaired fins. It shared its habitat with two species of barb and pot-smoking youths but Dennis thought we had caught only females, as the males he had caught on earlier visits had ladder markings in the caudal, like *B.stigmosa*. Back in Gerik, after 3 alcohol-free days in Terengganu and Kelantan, it was a relief to enjoy some tasty Chinese cooking of sweet and sour Tilapia and pork and yam not to mention beer again !



